



ONTARIO GEOLOGICAL SURVEY

Open File Report 6004

Report of Activities, 1999  
Resident Geologist Program

Thunder Bay North Regional Resident Geologist Report:  
Thunder Bay North and Sioux Lookout Districts

by

J.K. Mason, D. Farrow, G. Seim, G.D. White, M.S. O'Brien, A. Walden and C. Komar

2000

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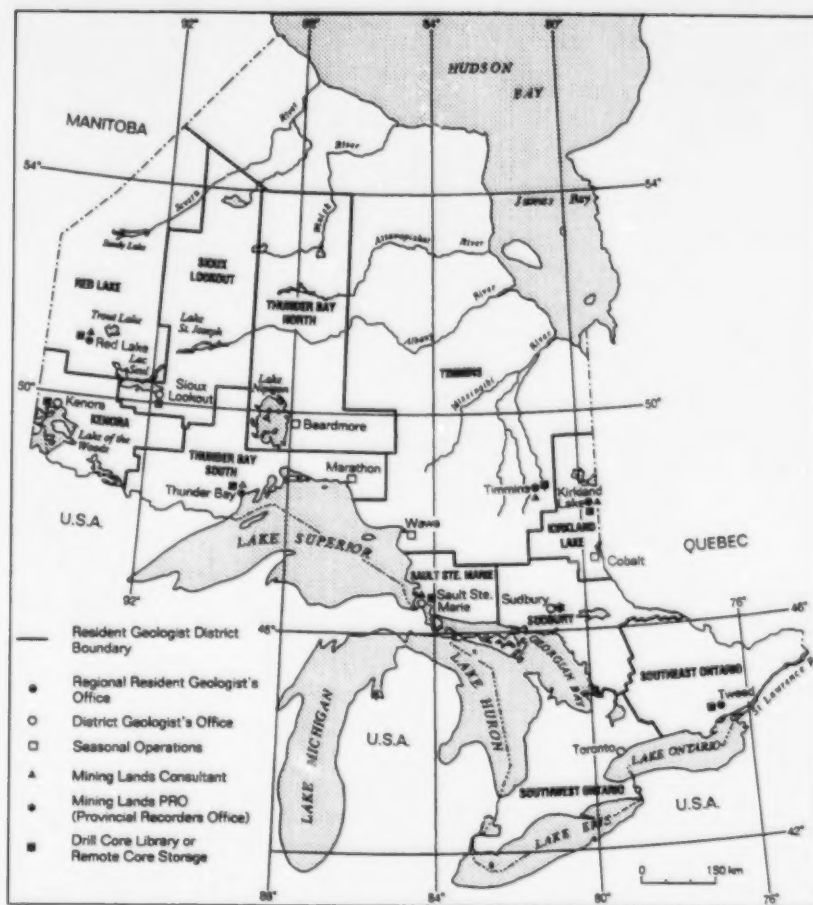
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Sault Ste. Marie	Suite 200, 70 Foster Dr. P6A 6V8	○ ■ ▲	(705) 945-6931 (705) 945-6925	(705) 945-6935 (705) 945-6935
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Kirkland Lake	10 Government Rd. E. P2N 1A2	● ■ ▲	(705) 568-4516 (705) 567-9242	(705) 568-4515 (705) 567-5621
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**ONTARIO GEOLOGICAL SURVEY**  
**RESIDENT GEOLOGIST PROGRAM**  
**REPORT OF ACTIVITIES—1999**

**THUNDER BAY NORTH**  
**REGIONAL RESIDENT GEOLOGIST REPORT**

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1. Thunder Bay North District
2. Sioux Lookout District





**Ontario Geological Survey  
Regional Resident Geologist Program**

**Thunder Bay North Regional Resident Geologist (Thunder Bay North  
District)--1999**

**by**

**J.K. Mason, G.D. White, M.S. O'Brien, C. Komar and A. Walden**

**2000**

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# THUNDER BAY NORTH (BEARDMORE-GERALDTON) DISTRICT--1999

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## INTRODUCTION

The Thunder Bay North District includes the former Beardmore-Geraldton District and Lake Nipigon, representing the central and northern portion of the Thunder Bay Mining Division. The communities of Beardmore, Jellicoe, Longlac, Geraldton, Macdiarmid, Nakina, Armstrong, Fort Hope, Kasabonika, Lansdowne House, Summer Beaver and Webequie are situated within the district. The Thunder Bay North Regional Resident Geologist is also responsible for the supervision of the Sioux Lookout District.

During 1999, the Ontario Prospectors Assistance Program (OPAP) funded 31 programs, totalling \$310,000, in the Thunder Bay North District.

## EXPLORATION ACTIVITY

Ontex Resources Limited drilled 35 diamond-drill holes, totalling 11 309 m, on the Brookbank, Cherbourg and Foxear properties in Irwin Township. Two diamond-drill holes on the east flank of the Brookbank gold deposit intersected 20.67 feet of core averaging 0.182 ounce per ton gold (hole BB-99-02) and 16.44 feet averaging 0.404 ounce per ton gold (hole BB-99-03) (Canada Stockwatch, July 16, 1999). The Brookbank gold deposit contains 1.4 million tons averaging 0.26 ounce per ton gold (Canadian Mines Handbook 1999-2000, p.318). An airborne radiometric, magnetometer and VLF-EM survey was completed during 1999, designed to identify potassium alteration, interpret structural geology, and identify mineralization marginal to magnetic anomalies that typically represent gabbro. Geological mapping was undertaken. Future diamond-drill programs will test the down plunge extension of the Brookbank deposit (R. Goad, Ontex Resources Limited, personal communication, 2000).

Pifher Resources Inc. completed a large, integrated exploration program on the Tyrol Lake gold, platinum and palladium property. Line cutting, induced polarization (IP) geophysical surveys, geological mapping and diamond-drilling programs were undertaken.

Cameco Gold Corp. conducted stripping, mapping, sampling and diamond drilling on the Big Bear gold zone of the Knucklethumb Lake property in the Metcalfe Lake area.

NWT Copper Mines Ltd. completed a major power stripping and sampling program on the Lincoln gold property, near Tashota. A large, porphyry gold-copper hydrothermal system has been identified as the mineral deposit model. Up to 9 feet grading 0.974 ounce per ton gold has been identified in a chip sample south of the south Lincoln (Hull) shaft.

#### **Thunder Bay North (Beardmore-Geraldton)--1999**

St. Anthony Gold completed magnetometer and electromagnetic geophysical surveys and an airborne geophysical survey at the Bearskin Lake gold property, Walters Township.

Avalon Ventures Ltd. discovered high-grade cesium mineralization in one of the several pegmatite dikes located at Lilypad Lake in the Fort Hope area. The dike--termed the Pollucite Dikey--is 12 m wide and assays up to 3.84%  $\text{Cs}_2\text{O}$ .  $\text{Ta}_2\text{O}_5$  values average 0.04% and  $\text{Rb}_2\text{O}$  values average 0.44%.

### **LAND USE PLANNING ACTIVITY**

Gerry White conducted several Mineral Resources Assessments (MRAs) for the Ontario Living Legacy initiative in the Thunder Bay North District.



Table 1. Assessment files received in the Thunder Bay North (Beardmore-Geraldton) District in 1999.

Abbreviations					
AEM .....	Airborne electromagnetic survey	Lc .....	Linecutting		
AM .....	Airborne magnetic survey	Met .....	Metallurgical testing		
ARA .....	Airborne radiometric survey	OD .....	Overburden drilling		
Beep .....	Beep Mat survey	ODH .....	Overburden drill hole(s)		
Bulk .....	Bulk sampling	OMIP .....	Ontario Mineral Incentive Program		
DD .....	Diamond drilling	OPAP .....	Ontario Prospectors Assistance Program		
DDH .....	Diamond drill hole(s)	PEM .....	Pulse electromagnetic survey		
DGP .....	Down-hole geophysics	PGM .....	Platinum group metals		
GC .....	Geochemical survey	Pr .....	Prospecting		
GEM .....	Ground electromagnetic survey	RES .....	Resistivity survey		
GL .....	Geological Survey	Samp .....	Sampling (other than bulk)		
GM .....	Ground magnetic survey	Seismic .....	Seismic survey		
GRA .....	Ground radiometric survey	SP .....	Self-potential survey		
Grav .....	Gravity survey	Str .....	Stripping		
HLEM .....	Horizontal loop electromagnetic survey	Tr .....	Trenching		
HM .....	Heavy mineral sampling	UG .....	Underground exploration/development		
IM .....	Industrial mineral testing and marketing	VLEM .....	Vertical loop electromagnetic survey		
IP .....	Induced polarization survey	VLFEM .....	Very low frequency electromagnetic survey		

Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
Ashmore Township	Houghton, F.	1997	GEM, GM	2.18688	42E10/NW
Ashmore Township	Houghton, F.	1998	DD, Samp	2.18968	42E10/NW
Ashmore Township	Houghton, F.	1998	DD, Samp	2.19338	42E10/NW
Clist Lake	Holt, L.	1998	Str, Tr, Samp	2.19597	42E12/NE
Elmhirst Township	Houghton, F.	1998	Pr	2.19405	42E13/SE
Elmhirst and Walters townships	Clarke, L.	1998	GEM, GM, Pr, DD, Samp	OP97-119	42E13/SE
Elmhirst and Walters townships	Houghton, F.	1997	GL, Str, Samp	2.19010	42E12/NE
Elmhirst and Walters townships	Houghton, F.	1998	Str, Tr, Samp	2.19424	42C13/SE
English Bay	Corona Gold Corporation	1998	AM, ARA, DD	2.19664	52H15/NW
English Bay area	Dean, R.	1997	GC, Pr, Samp, Thin Section	OP97-010	52H15/NW
Falcon Lake area	Grant, J.R.	1997	Pr, Samp	OP97-347	52I08/NE
Gzowski Township	Milks, G.	1997	GL, Pr, Str, Samp	OP97-071	42L06/SW
Gzowski Township	Milks, G.	1999	Str	2.19538	42L06/SW

Thunder Bay North (Beardmore-Geraldton) District--1999

Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
Gzowski Township	Milks, G. and Paul, C.	1999	Str	2.19662	42L06/SW, 42L03/NW
Gzowski Township	Milks, G. and Paul, C.	1999	Str, Tr	2.19747	42L06/SW, 42L05/NE
Gzowski Township	Pelky, R.	1997	Pr, Samp	OP97-023	42L04/NE
Irwin Township	Metalore Resources Ltd.	1999	DD	2.19692	42E12/NW
Irwin Township	Pettit, C.	1998	DD	2.19214	42E12/NW
Junior Lake area	Grant, J.	1997	Pr, Samp	2.18683	42L05/NW
Kaby Lake area	Checkley, F. and Lafontaine, S.	1998	Pr, Tr	2.19551	42E13/SE
Kaby Lake area	Lafontaine, A.	1997	Pr, Samp	OP97-044	42E13/SE
Kaby Lake area	Lafontaine, S.	1997	Pr	2.18466	42E13/SE
Klotz Lake	Swereda, M.	1999	Str, Tr	2.19694	42F13/SW
Klotz Lake area	Shields, J.	1997	Pr, Samp	OP97-038	42F13/SW
Legault Township	Nelson, M.	1998	Samp, Plugger	2.19342	42E11/NW
Maryjane Lake	Goodman, H.	1998	Str, Samp	2.18838	52H09/SE
Maryjane Lake	Goodman, H.	1999	Str, Samp	2.19691	52H09/SE
Maun Lake area	Clark, G. and Eveleigh, A.	1998	DD, Samp	2.18810	42L07/NW
McComber Township	Cote, R.	1997-98	GC, GL, GEM, GM, Lc	2.19459	42E12/NW
Meador Township	Lassila, P.	1998	Pr, Str, Samp	2.19086	42E13/SW
Metcalfe Lake	Yzerdraat, W.	1999	GC	2.19653	42L04/NE
Metcalfe Lake	Yzerdraat, W.	1999	GC	2.19792	42L04/NE
Oboshkegan Lake area	Ternowesky, J.	1997, 1998	GEM, GM, GL, DD, Samp	2.19111	42L03/NW
Oboshkegan Township	Cameco Corp.	1998	DD, Samp	2.18841	42L04/NE
Oboshkegan Township	Lafontaine, S.	1998	Pr	2.19385	42L04/NE
Oboshkegan Township	Peplinski, M.	1998	Tr	2.19108	42L04/NE
Oboshkegan Township	Saunders, D.	1997	Str, Tr	2.18694	42L04/NE

Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
Oboshkegan Township	Saunders, D.	1999	Recut Lines	2.19602	42L03/NW/SW, 42L04/NE/SE
Oboshkegan Township	Savage, J.L.	1998	Str, Tr, Samp	2.19383	42L04/NE
Opikieigen Lake area	Slam Expl. Ltd.	1998	IP, RES, GEM, GM	2.19423	52P09/NE
O'Sullivan Lake area	Traverse, A.	1998	GC, GL, Samp	2.19085	42L06/NE
Pifher Township	Cote, R.	1998	Pr, Samp	2.19119	42E13/SW
Pifher Township	Grant, J.R.	1997	Pr, Samp	OP97-347	42E13/SW
Pifher Township	Spruce Ridge Res. Ltd.	1997	IP, GC, GEM, GM, GL, Samp	2.18766	42E13/SW
Pikitigushi Lake area	Triex Resources Inc.	1998	GC, Lc, Samp	2.19090	52I07/NE
Pikitigushi Lake area	Triex Resources Inc.	1998	GL, Pr, Samp	2.19138	52I07/NE
Rickaby Township	Consolidated Shoshoni Gold Inc.	1998	IP, GM	2.18823	42E13/SE
Sim Lake area	Whalen Res.	1997	GEM, GM	2.18805	52P01/SE
Summers Township	Goodman, H.	1997	Pr, Samp	OP97-085	52H09/SE
Toronto Lake area	Wing Res. Inc.	1998	Str, Tr, Samp	2.19123	42L05/SW
Treptow and Alfred lakes	Willy, A.	1998	Str, Tr	2.19663	42E14/SE, 42E15/SW
Treptow Lake and Kirby Township	Johansen, T.	1998	Str, Tr, DD	2.19217	42E14/SE
Tyrol Lake area	MacAdam, R.	1997	GEM, GM, Pr, Tr	OP97-211	42E13/SW
Vincent Township	Maki, N.	1998	Str, Tr	2.19069	42E12/NE
Walters and Irwin townships	Auger, T.	1997	Pr, Str, Tr, Samp	OP97-166	42E12/NW
Walters Township	Lassila, P.	1998	Pr, Str, Samp	2.19109	42E12/NE

# Thunder Bay North (Beardmore-Geraldton) District--1999

**Table 2.** Exploration activity in the Thunder Bay North (Beardmore-Geraldton) District in 1999 (keyed to Figures 1 and 2).

Abbreviations			
AEM .....	Airborne electromagnetic survey	Lc .....	Linecutting
AM .....	Airborne magnetic survey	Met .....	Metallurgical testing
ARA .....	Airborne radiometric survey	OD .....	Overburden drilling
Beep .....	Beep Mat survey	ODH .....	Overburden drill hole(s)
Bulk .....	Bulk sampling	OMIP .....	Ontario Mineral Incentive Program
DD .....	Diamond drilling	OPAP .....	Ontario Prospectors Assistance Program
DDH .....	Diamond drill hole(s)	PEM .....	Pulse electromagnetic survey
DGP .....	Down-hole geophysics	PGM .....	Platinum group metals
GC .....	Geochemical survey	Pr .....	Prospecting
GEM .....	Ground electromagnetic survey	RES .....	Resistivity survey
GL .....	Geological Survey	Samp .....	Sampling (other than bulk)
GM .....	Ground magnetic survey	Seismic .....	Seismic survey
GRA .....	Ground radiometric survey	SP .....	Self-potential survey
Grav .....	Gravity survey	Str .....	Stripping
HLEM .....	Horizontal loop electromagnetic survey	Tr .....	Trenching
HM .....	Heavy mineral sampling	UG .....	Underground exploration/development
IM .....	Industrial mineral testing and marketing	VLEM .....	Vertical loop electromagnetic survey
IP .....	Induced polarization survey	VLFEM .....	Very low frequency electromagnetic survey

No	Company/Individual (Occurrence Name) or Property	Township/Area (Commodity)	Exploration Activity
1	Aardex Corporation	Dorothea and Sandra townships (Au)	Comp
2	Avalon Ventures Limited (Lilypad Lake property)	Fort Hope (Li, Cs, Ta)	GL, Samp
3	Cameco Gold Inc. (Knucklethumb Lake property)	Oboshkegan Township (Au)	Str, DD, Samp
4	Canplats Resources Corporation	Grand Bay (Pt, Pd)	GM, IP, Lc
5	Checkley, F. and Lafontaine, S.	Kaby Lake area (Au)	Pr, Tr, Samp
6	Clark, G.	N. Lake Nipigon (Li, Cs, Ta)	Pr, Str, Samp
7	Clarke, L. (Mud Lake property)	Elmhirst Township (Au)	Pr, Str, Samp
8	Corona Gold Corporation (English Bay property)	English Bay (Au, Cu)	AM, ARA, DD
9	Cote, Richard (Miner Lake property)	Pifher Township (Cu)	GL, Pr, Str, Samp
10	Cote, Robert (Miner Lake property)	Pifher Township (Au, Cu)	GL, Pr, Str, Samp
11	Cox, N. (South Lincoln property)	Tashota (Au)	GL, Pr, Str, Samp
12	Cox, T.	Irwin Township (Au)	GL, Pr, Str, Samp
13	Dean, R. and Kathman, P. (Lynx Harbour property)	S.W. Lake Nipigon (Au)	GL, Pr, Samp

No	Company/Individual (Occurrence Name) or Property	Township/Area (Commodity)	Exploration Activity
14	East West Resource Corporation	English Bay (Pt, Pd)	GM, IP, Lc
15	Fenwick, K. (Linsey Bay property)	Shabuskwia Lake (Pt, Pd, Co, Cu, Ni)	Pr
16	Hardrock Extension Inc. (Ferau property)	Coltham Township (Au)	DD, Samp
17	Holt, L. and Holt, M. (Crooked Green Lake property)	Martin Lake (Cu, Ni, Pt, Pd)	GL, Pr, Str, Samp
18	Houghton, F. (Mud Lake No. 2 Extension)	Elmhirst Township (Au)	Pr, Str, Samp
19	Houghton, F. and Lassila, P.	Humboldt Bay (Au)	GEM, Pr, Samp
20	Houghton, P.	Elmhirst Township (Au)	Pr, Str, Samp
21	Inco Limited	N. Lake Nipigon (Pt, Pd, Cu, Ni)	Pr, Samp
22	Lac Properties (Barrick Gold Corporation) (MacLeod-Cockshutt Mine)	Ashmore Township (Au, Ag)	Rehab
23	Lafontaine, A. & Lafontaine, S. (Minnow Lake property)	Summers Township (Au, Ag)	Pr, Str, Tr, Samp
24	Lance, C.	Metcalf Lake (Au)	Pr, Samp
25	Landore Resources Inc.	N. Lake Nipigon (Pt, Pd, Cu, Ni)	Pr, Samp
26	Lassila, P.	Walters Township (Au)	GEM, GL, Pr, Str, Samp
27	MacAdam, R.	Dorothea and Sandra townships (Au)	GL, Pr, Str, Samp
28	Maitland, T.	N. Lake Nipigon (Li, Cs, Ta)	Pr, Str, Samp
29	Metalore Resources Ltd. (Cherbourg property)	Irwin Township (Au)	DD
30	Milks, G. and Paul, C.	Gzowski Township (Zn, Au)	Str
31	Milks, G. and Paul, C.	Gzowski Township (Zn, Au)	Str, Tr, Samp
32	Nelson, M. and Savage, J. (Daphne Lake property)	Rickaby Township (Au)	GC, GL, Pr, Str, Tr, Samp
33	N.W.T. Copper Mines Limited (Lincoln property)	Tashota (Au)	Pr, Str, Samp
34	Ontex Resources Limited (Cherbourg property)	Irwin Township (Au)	ARA, AM, AEM, GL, DD, Lc, Samp
35	Parent, S.	Attwood Lake (Cu, Zn)	GL, Pr, Samp
36	Peplinski, M.	Oboshkegan Township (Au)	Pr, Str, Samp
37	Pettit, C. (Watson Lake property)	Irwin Township (Au)	DD
38	Pifher Resources Inc. (Tyrol Lake property)	Pifher Township (Au, Pt, Pd)	IP, GL, DD, Lc, Samp

Thunder Bay North (Beardmore-Geraldton) District--1999

No	Company/Individual (Occurrence Name) or Property	Township/Area (Commodity)	Exploration Activity
39	Roach, S. (Wobbegong property)	Oboshkegan Township (Cu, Zn, Au)	GM, GEM, GL, Pr, Lc, Samp
40	St. Anthony Gold (Bearskin Lake property)	Walters Township (Au)	GM, GEM, ARA, AM, AEM
41	Saunders, D.	Oboshkegan Township (Au)	Recut Lines
42	Shields, S. (Roche Longlac Gold Mine)	Ashmore Township (Au)	GL, Pr, Str, Samp
43	Smith, M.	Castlebar Lake (Au)	GC, GEM, GM, Str, Samp
44	Swereda, M.	Klotz Lake area (Au)	Str, Tr, DD
45	Thibault, D. and Smith, B.	Sim Lake (Pt, Pd, Cu, Ni)	Pr, Samp
46	Wing Resources	N. Lake Nipigon (Pt, Pd, Cu, Ni)	Pr, Samp
47	WNW Prospecting Syndicate (Pichette Zinc)	McQuesten Township (Zn)	IP, Str, Tr, DD, Lc, Samp
48	Yzerdraat, W.	Metcalf Lake (Au, Cu, Zn)	GC, GL, Pr, Samp
49	Yzerdraat, W.	Metcalf Lake area (Au, Cu, Zn)	GC
50	Yzerdraat, W.	Metcalf Lake area (Au, Cu, Zn)	GC

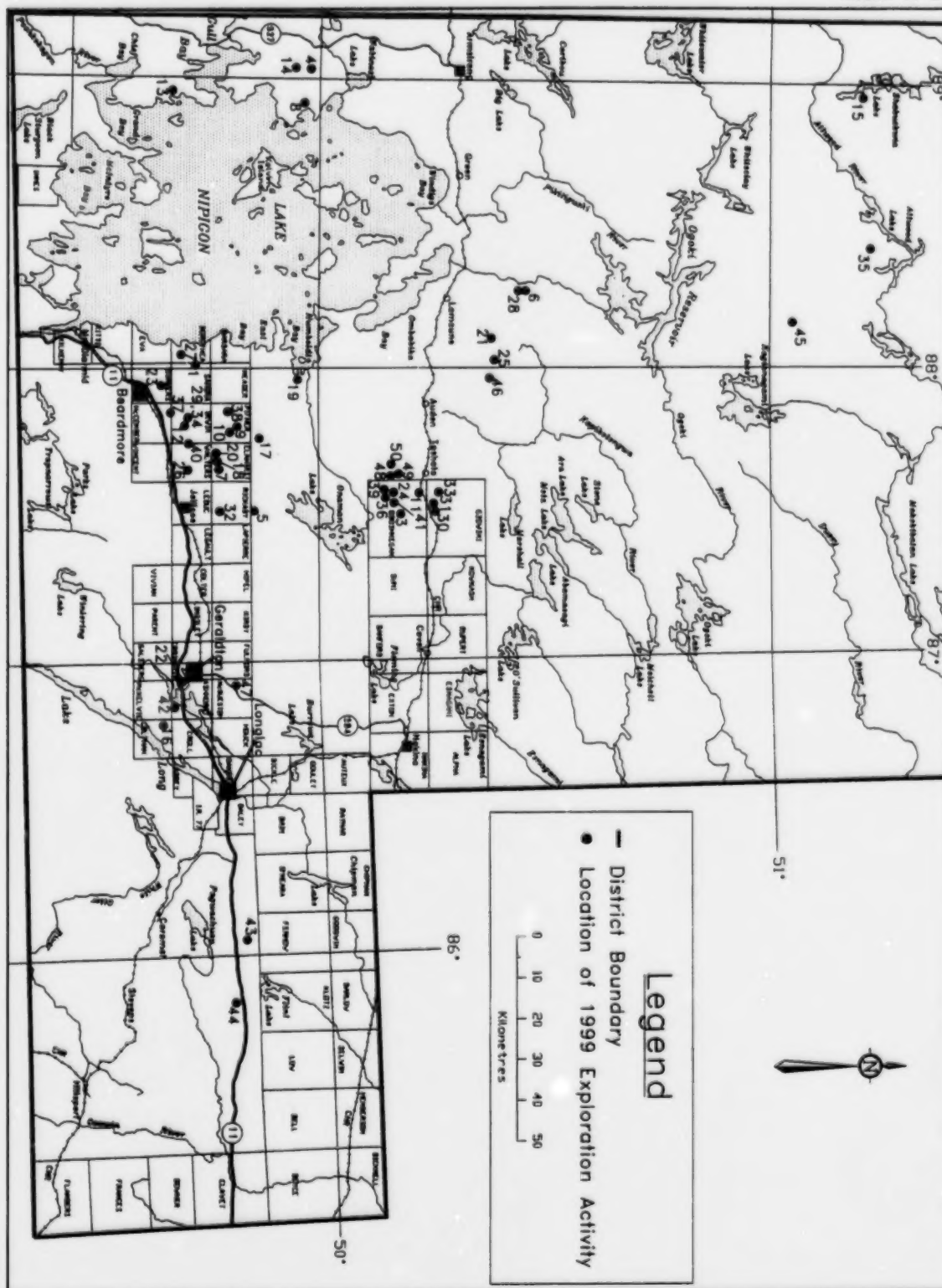


Figure 1. Thunder Bay North (Beardmore-Geraldton) District (South Map) Exploration Activity, 1999.



THUNDER BAY NORTH (BEARDMORE-GERALDTON) DISTRICT--1999

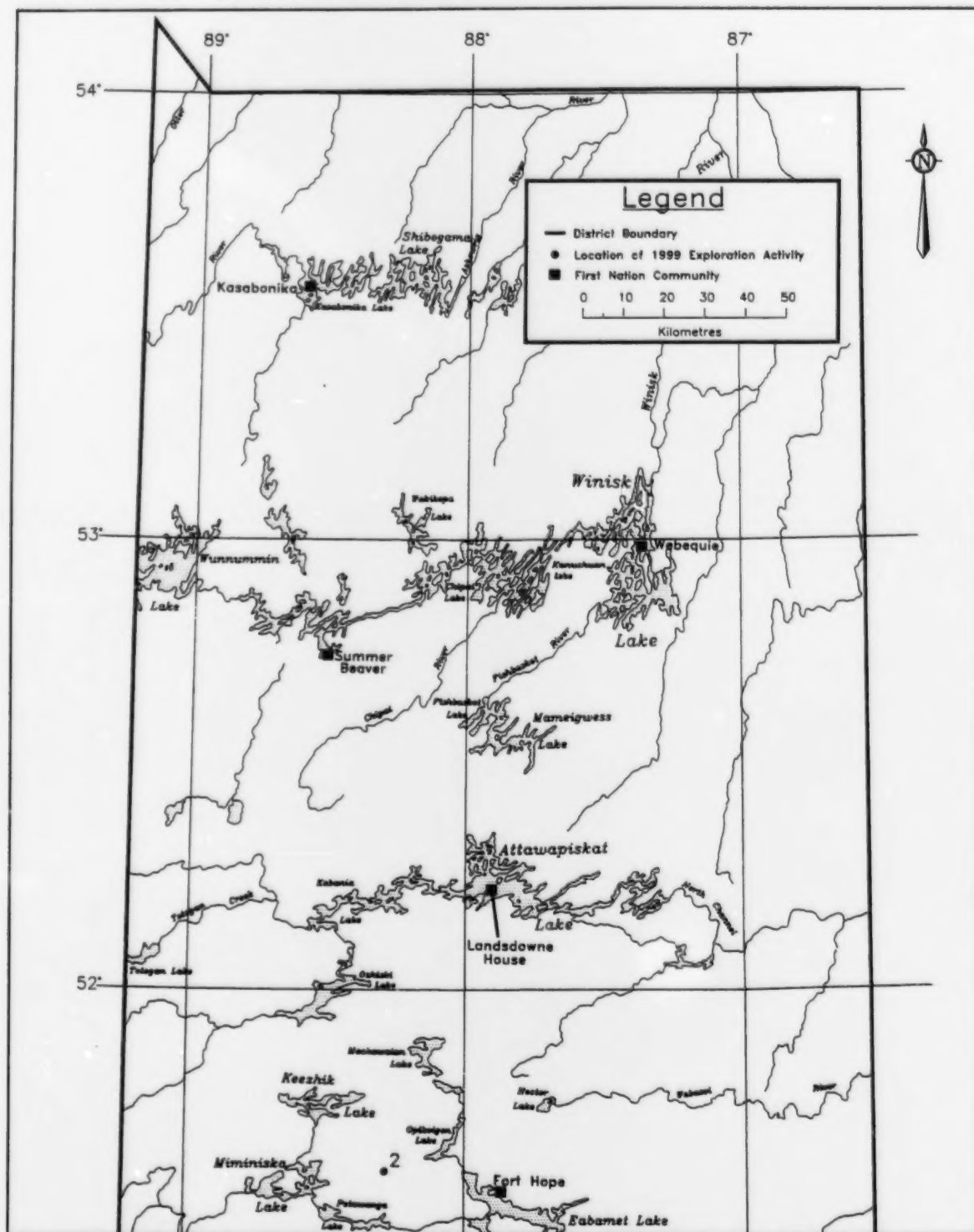


Figure 2. Thunder Bay North (Beardmore-Geraldton) District (North Map) Exploration Activity, 1999.



## RESIDENT GEOLOGIST PROGRAM STAFF AND ACTIVITIES

During 1999, the staff of the Thunder Bay North Resident Geologist (Beardmore-Geraldton) Program included: J. Mason, Regional Resident Geologist; G. White, District Geologist; C. Komar, Administrative Assistant; A. Walden, District Support Geologist (January to August) and A. Lichtblau, District Support Geologist (December). Significant support to the Program was also provided by M. O'Brien, Regional Support Geologist for the Northwest Region and A. Dowton, Administrative Assistant.

In 1999, 47 property visits were conducted. Seventy-seven Mineral Deposit Inventory (MDI) records were edited. The Resident Geologist Program handled 1854 personal consultations and 1105 telephone inquiries in the Beardmore, Geraldton and Thunder Bay offices. The Beardmore field office, established in 1996 in conjunction with the community of Beardmore, was staffed one day per week, from May to October. The Geraldton field office was maintained in conjunction with the Northern Development Office two days per month, from May to October. Staff attended the Northwestern Ontario Prospectors Association (NWOPA) Mines and Minerals Symposium in Thunder Bay in April, providing a display and talk, and the Prospectors and Developers Convention in Toronto during March, providing displays.

**Table 3.** Property visits conducted by the Thunder Bay North (Beardmore-Geraldton) District in 1999

Number (keyed to Figure 3)	Property/Occurrence
1	Bankfield Mine (Roxmark Mines Ltd.): Au
2	Barton Island Iron Deposit (Roxmark Mines Ltd): Fe
3	Big Bear Occurrence (Cameco Gold Inc.): Au
4	Boundary Zone Occurrence (F. Houghton, L. Clarke): Au
5	Brookbank Gold Property (Ontex Resources Limited): Au
6	Claim Line Occurrence (Cameco Gold Inc.): Au
7	Cleo Point Property (H. Goodman Jr.): Au
8	Crooked Green Creek Gold Prospect (Spruce Ridge Res.): Au
9	Crooked Green Lake (L. Holt, M. Nelson): Cu, Ni, PGE
10	Daphne Lake Property (M. Nelson, L. Holt): Au
11	Davidson Carr Mine (Sioux Lookout District): Au
12	Dorothea Gold Property (F. Houghton): Au
13	English Bay (Lake Nipigon) Property (Corona Gold Corporation): Au, Cu
14	Hardrock Mine (Barrick Gold Corp.): Au
15	Houghton-Clarke Elmhirst Property (F. Houghton, L. Clarke): Au
16	Island Prospect (Sioux Lookout District): Au
17	Jaz Occurrence (Cameco Gold Inc.): Au
18	Ketchikan Lake Conwest Cu-Ni Deposit (Wing Resources/Landore Res.): Cu, Ni
19	Kirby Lake Zinc Property (T. Johansen & Partners): Zn, Au

# Thunder Bay North (Beardmore-Geraldton) District--1999

20	Lac des Iles Mine (Thunder Bay South District): Pd, Pt
21	Lafontaine Minnow Lake Property (A. Lafontaine): Au
22	Leitch Gold Mine Property (Teck Corporation): Au
23	Lincoln (Hull) Gold Occurrence (NWT Copper Mines): Au
24	MacLeod-Cockshutt Mine (Barrick Gold Corp.): Au
25	Magnet Mine Property (Roxmark Mines Ltd.): Au
26	Major General Base Metal Property (Sioux Lookout District): Cu, Zn
27	McLellan Mine (Roxmark Mines Limited): Au
28	Metcalf Lake Property (W. Yzerdraat): Au
29	Miner Lake Property (R. Cote): Au, Zn
30	Missing Link Extension Occurrence (M. Nelson): Au
31	Missing Link Occurrence (L. Holt, M. Nelson, N. Cox): Au
32	Mud Lake No. 2 Extension Occurrence (F. Houghton, L. Clarke): Au
33	Mud Lake No. 2 Occurrence (F. Houghton, L. Clarke): Au
34	Mud Lake No. 3 Occurrence (F. Houghton, L. Clarke): Au
35	Pettit Watson Lake Property (C. Pettit): Au
36	Powell Prospect (Sioux Lookout District): Au
37	Quebec-Sturgeon River Gold Mine (St. Andrew Goldfields Ltd.): Au
38	Ryne Occurrence (Cameco Gold Inc.): Au
39	St. Anthony Gold Mine (Sioux Lookout District): Au
40	Sand River Gold Mine (Sand River Resources Ltd.): Au
41	South Lincoln Gold Occurrence (N. Cox): Au
42	Stares Cu-Ni Occurrence (M. Stares, S. Stares): Cu, Ni
43	Talmora Gold Mine (Tombill Mines Limited): Au
44	Triex-Minnitaki Lake Au Property (Sioux Lookout): Au
45	Tyson Occurrence (N. Cox, F. Houghton, P. Lassila): Au, Mo
46	Wing Boulder Occurrence (A. Wing): Cu
47	Wobbegong Property (S. Roach): Cu, Zn, Au

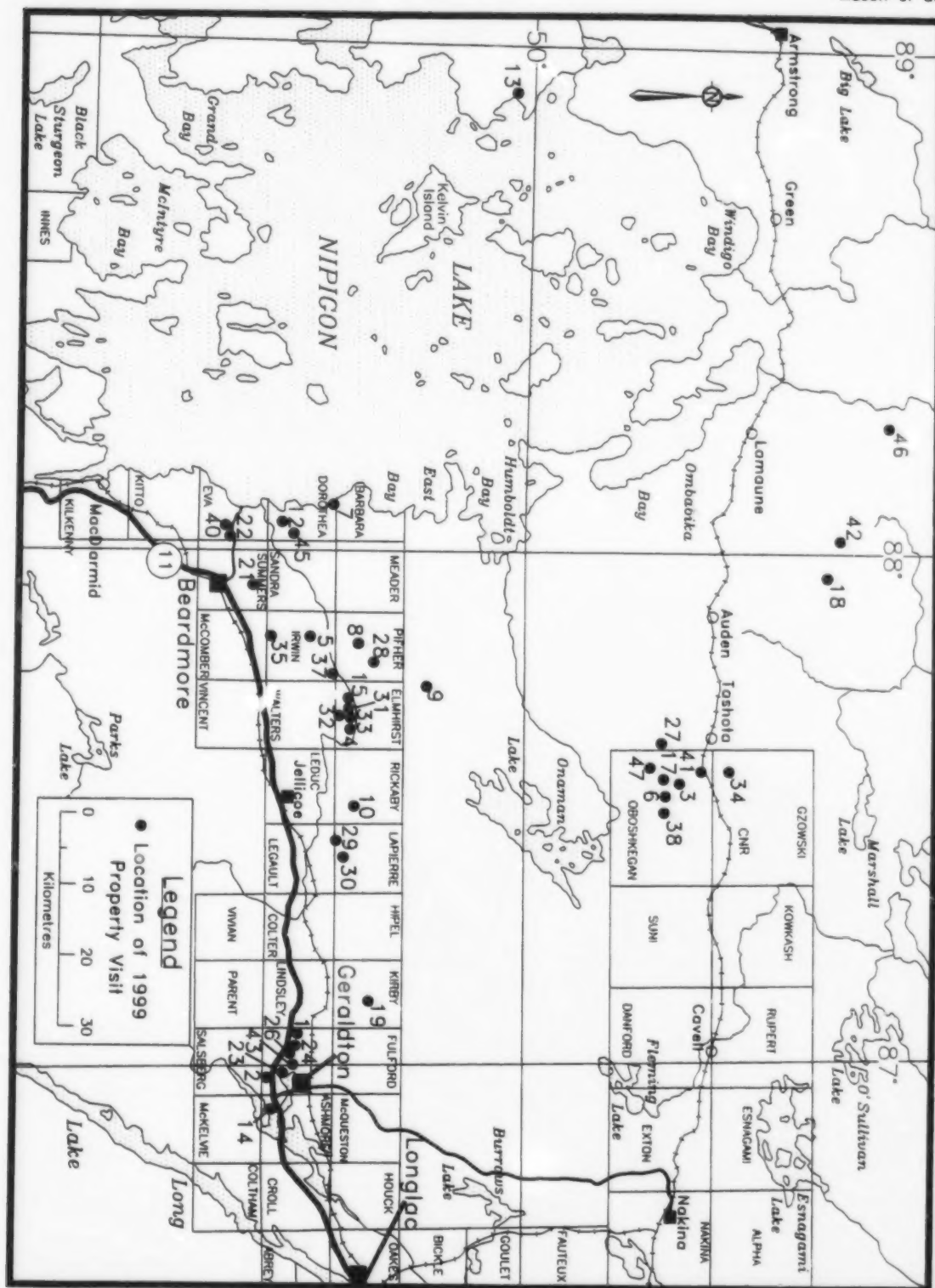


Figure 3. Thunder Bay North (Beardmore-Geraldton) District Property Visits, 1999.

## PROPERTY EXAMINATIONS

### English Bay Property

The English Bay property is located on the west shore of Lake Nipigon, approximately 170 km north of Thunder Bay. The property was initially staked in September 1997 and consisted of 5 claims, totalling 80 claim units (TB 1231615 to 1231619 inclusive) located on English Bay of Lake Nipigon. In 1998, Corona Gold Corporation optioned the property from owners R.J. Dean and P. Kathmann and immediately staked an additional 316 claims, covering 6336 ha, to include the entire known extent of the granitic intrusion. Access to the property is by means of boat from Gull Bay or Beardmore, or by aircraft from Armstrong or Thunder Bay.

In 1997, R.J. Dean, under an OPAP grant, and assisted by P. Kathmann, completed prospecting, geological mapping, soil geochemical sampling, stream sediment sampling and litho-geochemical sampling on the property. No record of previous exploration exists for the English Bay area. Corona Gold Corporation has completed a helicopter-borne magnetic, radiometric and electromagnetic survey of the property, totalling 772 line km. Five diamond-drill holes totalling 2650 m were drilled.

The geology was described in the Report of Activities, 1997, Resident Geologist Program (Mason et al. 1998):

Robert Dean (1997) described the geology:

The Nipigon Embayment consist of a sequence of Mesoproterozoic pre-Keweenaw sedimentary rocks of the Sibley Group and the Keweenaw Nipigon diabase sills. Overlying the Archean Superior Province they form a broad basinal structure extending north of Lake Superior for 160 km. The OGS has mapped a fluorite-bearing subvolcanic porphyry to granite inclusion centered on English Bay Lake Nipigon. They suggest that an arcuate reverse fault along the east shore of northern Lake Nipigon provides evidence for a caldera structure which may be associated with the emplacement of the English Bay Granite and associated rocks. The quartz-feldspar-porphyry and granite locally contain numerous inclusions of felsite, porphyry, pumice fragments and it is considered to be a center of felsic volcanism.

Volcanic fragmental rocks (dacite to rhyolite) associated with the granite intrusion on English Bay include debris flow, welded tuff, and tuff-breccia. They are sparsely preserved beneath the diabase sills as are sedimentary rocks consisting of mainly quartz arenite with minor conglomerate that contains clasts of porphyry and felsite in a quartz arenite matrix. The 1.54 billion-year-old anorogenic (A-type) English Bay Granite exposed in northwestern Lake Nipigon contains moderately to strongly hematized and sericitized orthoclase with quartz, chloritized biotite, [zircon] and fluorite. The granite on English Bay has elevated levels of zirconium, yttrium and rare earth elements (OGS).

Minor pyrite has been observed disseminated in the quartz-feldspar porphyry. Sericite and hematite alteration were noted in R.J. Dean's 1997 OPAP final submission and anomalous geochemical assays in the following elements: Ag, As, Ba, Bi, Ce, Co, Cr, Cu, Fe, Ga, K, La, Li, Mg, Sb, Sr, Th, Ti, V, Y and Zn. A copper-bismuth metal association is present. Elevated K, Th and U were documented by the Geological Survey of Canada in a geophysical survey at the English Bay property.

High Sense Geophysics Limited conducted the airborne geophysical program and identified 7 large magnetic and radiometric targets. These anomalies suggested the presence of felsic intrusive centres with the English Bay granitic intrusion and areas of intense fracturing. Five, vertical, diamond-drill holes were drilled in 3 of the 7 target areas to provide more geology information.

Corona's 1998 Annual Report (Corona Gold Corp. 1998) summarized results of the drill program:

Two of these holes, EB-1 and EB-2, spaced 700m apart, were drilled in the target area "A", indicated by a large, ring-shaped magnetic feature, 3.2 km in diameter, and characterized by subtle magnetic lineaments, interpreted as possible ring faults. Hole EB-3, drilled another 700m to the southeast of EB-2, was spotted at the southeast margin of target area "A" which correlated with an area of anomalous geochemistry as indicated by the initial soil-and-stream sampling. Holes EB-4 and EB-5 were drilled in target areas "B" and "C", interpreted as small intrusive centres in the southeastern part of the granitic intrusion.

The results of the drilling indicate that, where drilled, the English Bay intrusion is composed of mostly massive, undeformed quartz-feldspar porphyry and equigranular granite, that had undergone strong iron metasomatism, and local sericite alteration. No significant sulphide mineralization or veining was noted in any of the core. It is important to note, however, that hole EB-3 encountered two extensive zones of intense brecciation. The brecciated rock is interpreted to be intrusive in origin, as it is composed of a variety of mostly exotic fragments, ranging in size up to 40cm. As the Olympic Dam ore bodies are wholly hosted by a variety of brecciated rocks, the occurrence of breccias in hole EB-3 may be a significant feature.

Each of the holes encountered a younger diabase intrusion, ranging in thickness from 56m in hole EB-4 to 271m in EB-2. The diabase is interpreted to be a part of the Logan sills, which are relatively flat-lying bodies underlying most of the Lake Nipigon area, and almost totally surrounding the English Bay granite.

Although the absence of significant sulphide mineralization in these initial drill holes may be regarded as disappointing, the similarities between the geological settings of the English Bay intrusion and the Olympic Dam deposit remain intact. The geology of the balance of the property has to be mapped, and the geochemical surveying of the rest of the claims completed before additional drilling on the balance of the geophysical targets is considered. This work will be done with particular emphasis on the remaining target areas indicated by the airborne geophysical survey, and on the area in the vicinity of hole EB-3 which encountered extensive brecciation.

## Juneau-Ketchikan Lakes (Auden) Copper-Nickel-Platinum Group Element (PGE) Property

The Juneau-Ketchikan lakes (Auden) property is located 25 km northeast of Ombabika Bay, Lake Nipigon and 6.5 km northwest of Toronto Lake. Access to the west portion of the property is gained by following a forest access road for 100 km east-northeast from Armstrong, Ontario, to a point where the road currently terminates in a loop (as of October 7, 1999). The main copper-nickel-PGE deposit, Zone B4-7, is accessible on foot by traversing east for 1.8 km from the loop at the road's end. The property consists of 73 staked claim units and 2 leased claims controlled by Wing Resources and Landore Resources Inc.: (1) Brancote Canada Limited owns 2 leased claims (PA 39127 and PA 39128) and unpatented claim TB 1216605 (12 units); (2) Wing Resources Inc. is the recorded holder of the remaining 61 units which includes unpatented claims TB 1213626, TB 1215348, TB 1217179, TB 1217180, TB 1217181 and TB 1217182. Reconnaissance geological mapping, prospecting and sampling were undertaken in 1999. Diamond drilling was subsequently recommended.

Keneco Explorations (Canada) Limited (1952) completed an aeromagnetic geophysical survey covering a large area, including Juneau Lake. Dr. E.G. Pye, Ontario Department of Mines, mapped the Crescent Lake area in 1959 and 1962. This included the Juneau-Ketchikan lakes area and was summarized in Geological Report 55 (Pye 1968). From 1967 to 1970, International Mogul Mines Ltd., Canadian Dyno Mines Ltd. and North Coldstream Mines Limited conducted airborne magnetic and electromagnetic geophysical surveys and staked over 300 claims in numerous blocks. Ground geophysical surveys, geological mapping, sampling and diamond drilling were undertaken. Forty-six holes were diamond drilled, totalling 27 047 feet: 31 holes (22 772 feet) were drilled to test the B4-7 copper-nickel zone and 15 holes (4275 feet) were drilled to test 9 other anomalies. In 1984, Quebec Cobalt and Exploration Limited completed a soil and rock geochemical survey and surficial geological mapping of a large claim block located south of the 2 leased claims, and between Juneau and Ketchikan lakes. In 1989, Exploration Laminco Inc. carried out a regional airborne geophysical survey, ground geophysics and sampling around the B4-7 zone. Diamond-drill core from the International Mogul-North Coldstream 1969 drilling was re-assayed. In 1989, the Ontario Geological Survey contracted the Tashota-Geraldton-Longlac Airborne Electromagnetic and Total Intensity Survey to Aerodat Limited (OGS 1989). B. Berger of the Ontario Geological Survey mapped the eastern portion of the claim block as part of a quarter-mile mapping project covering the Toronto Lake area (Berger 1992).

The Juneau-Ketchikan lakes area is underlain by the north portion of the Onaman-Tashota metavolcanic belt, which is part of the eastern Wabigoon Subprovince. Supracrustal rocks are composed of mafic, intermediate and felsic metavolcanic rocks, associated mafic to ultramafic intrusive rocks (composed of peridotite, pyroxenite and gabbro), and clastic metasedimentary rocks. Felsic plutonic rocks are composed of tonalite, quartz diorite, granite and granodiorite.



## Thunder Bay North (Beardmore-Geraldton) District--1999

Berger (1992) described the geology of the Juneau-Ketchikan lakes area as being a portion of the Marshall Lake group:

Mafic metavolcanic rocks, composed of massive and pillowed flows, mafic tuff, derived schist and amphibolite comprise approximately 50% of the Marshall Lake group (Amukun 1989) in the map area and occur north of Toronto Lake and along the northern portion of the map area.

North of Toronto Lake mafic metavolcanics comprise a west-northwest trending sequence of pillowed and massive flows with minor schist and tuff. Intermediate pyroclastics and cherty interflow metasediments are intercalated with the mafic metavolcanics and they are intruded by a distinctive gabbro sill and several quartz-feldspar porphyritic dikes. Pillowed flows are predominant in this sequence and pillows are generally 1 m by 50 cm in size, closely packed with thin (5 mm) to thick (2 cm) rims and may contain up to 10% quartz filled amygdules. Massive flows are dark green to black, fine-grained rocks which are generally equigranular, however, near the contact with the Toronto Lake group mafic flows locally contain up to 50% white anhedral plagioclase phenocrysts.

Mafic tuff was observed in only a few places north of Toronto Lake as narrow interflow units or intercalated with more extensive, intermediate, pyroclastic deposits.

Chlorite  $\pm$  carbonate schist is common within a large deformation zone north of Toronto Lake and is fissile to friable in character. In several places mafic schist contains quartz stringers and veins, sulphide mineralization and rarely tourmaline which indicates hydrothermal solutions were focussed in the deformation zone.

Pillowed flows are well exposed in the eastern part of this sequence and pillow shapes consistently indicate that stratigraphy youngs to the north and northwest. The predominance of pillowed over massive flows, the presence of interflow tuff and cherty metasediments and the common occurrence of amygdules indicates that this sequence was deposited in a distal, deep to shallow water environment (cf Easton and Johns 1986).

In the northern part of the map area a westerly trending sequence of mafic metavolcanics attains a maximum apparent thickness of 1500 m. These rocks are composed predominantly of mafic tuff amphibolite, and minor massive and pillowed flows. Intermediate tuff, wacke, sulphide and oxide facies ironstone are interbedded with the mafic rocks and locally comprise mappable units.

Mafic tuff is predominant in this sequence and is black to dark green, commonly displaying centimeter scale bedding. Where deformation and metamorphism has destroyed primary features banded, garnetiferous amphibolite commonly occurs. Heterolithic lapilli tuff breccia are locally present and contain stretched white feldspathic fragments up to 10 cm in size.

Massive and pillowed mafic flows are minor components and generally form narrow discontinuous units interlayered with mafic tuff. Flow rocks are black, fine to medium grained and generally equigranular. Pillows are non-vesicular, 70 cm by 25 cm in size, and closely packed with thick (1 cm plus) rims.

Primary structures are poorly preserved in this northern sequence. Only two younging directions were observed and both indicate that the stratigraphy youngs to the south. The predominance of tuff, the generally small scale bedding, and intercalation of wacke and intermediate tuff indicates deposition in a distal, low energy environment.

Berger (1992) further described the structural geology of the Marshall Lake group and Juneau-Ketchikan lakes area:

Two periods of deformation have affected the supracrustal rocks. A regional deformation rotated the supracrustal lithologies into near vertical attitudes and resulted in the development of a large west-northwest trending deformation zone north of Toronto Lake. The deformation zone is the most prominent structural feature in the area and is characterized by narrow discrete zones of intensely sheared rock displaying dextral rotation separated by relatively undeformed rocks. The deformation zone is expressed as an aeromagnetic lineament which extends west of the map area and appears to join with the Sydney Lake - Lake St Joseph Fault Zone which marks the boundary of the English River and Wabigoon subprovinces.

The second, more local deformation is confined to the supracrustal rocks around the periphery of the Robinson Lake batholith. The deformation is expressed as crenulation cleavage, northeast trending faults and lineations which clearly post-date the regional deformation.

Larouche (1998) described the geology and mineralization of the Juneau-Ketchikan (Auden) copper-nickel-PGE property, including the Toronto Lake intrusive complex:

The Toronto Lake intrusive complex is part of the Toronto Lake group. It is composed of mafic to ultramafic sills, dikes and stocks which intrude the volcanic and sedimentary stratigraphy. Peridotite, pyroxenite, gabbro and anorthosite are observed commonly as layered intrusives that are locally pegmatitic.

The Toronto Lake intrusive complex underlies much of Toronto Lake and forms an extensive sill up to 800 meters in width that marks the top of the Toronto Lake group along a major regional deformation zone. The mafic and ultramafic units commonly contain Cu-Ni-Co sulphides and peridotite units exhibit high Ni backgrounds averaging 0.1-0.3% Ni and Cr up to 3.5%. Platinum group metals are present with the base metal minerals but have only recently been identified and have received little exploration attention.

Of the numerous Cu-Ni occurrences which have been identified in the project area, only the B4-7 deposit has received a significant amount of exploration. The B4-7 zone was detected on three flight lines spaced at 650 foot intervals by a combined magnetic and electromagnetic survey performed by Canadian Aero Minerals Surveys Limited. Detailed ground electromagnetic and magnetic surveys outline the zone for a length of about 1800 feet.

The strike of the west half of the B4-7 zone is due east-west, whereas the east half swings to a bearing of south 76 degrees east. The B4-7 anomaly is one of many conductors outlined on a zone of conductively trending in a more or less east-west direction on the claims. Few of these zones have been investigated by drilling and most carry anomalous values in copper-nickel mineralization.

The B4-7 mineralized zone is predominantly a massive sulphide consisting essentially of pyrrhotite. With minor pyrite, chalcopyrite, pentlandite and magnetite. The sulphide zone appears to be localized along an intra-flow siliceous, tuffaceous, metasediment horizon, which in part is completely replaced. The enclosing thick succession of flow rocks are fine-to-medium grained andesitic lavas metamorphosed to typical quartz amphibolites and hornblende schists. Intruding the volcanic and sediment are sill-like masses of fine-to coarse grained anorthositic gabbros. Individual sills vary considerably in thickness and texture, both in a horizontal and vertical plan. The tenor of nickel and copper sulphide mineralization is the greatest where the thick sills of the anorthositic gabbro envelope or flank the key metasediment horizon and andesitic lavas. The strike of the B4-7 zone varies from east-west to south 76 degrees east. Dip of the zone is mainly to the north at about 80 to 85 degrees. Along strike and down dip, there is local variation, where the dips change to vertical and steeply south. There appears to be a westerly rake to B4-7 zone of about 60 degrees.

At bedrock surface (20 feet overburden) the width of the B4-7 zone varies from 10 to 30 feet, with an average horizontal width of 20 feet. Along strike and down dip, widths vary from about 3.0 feet to 100 feet.

Throughout the B4-7 sulphide zone, particularly the thicker portions of it, there are numerous inclusions of fragments of metabasic volcanics. It would appear that the key sediment horizon is probably not as continuous as one could surmise. If it is a continuous horizon, it must be in places exceedingly narrow and completely replaced by the sulfides.

The conclusion reached by M.E.M. Consultants Limited in 1970 is that the sulphide mineralization is of hydrothermal origin related to the anorthositic gabbro intrusion. The sulphide deposit has been formed both as injections of a sulphide melt along a brecciated flow contact and as sulphide replacement of the key sediment horizon.

A composite metallurgical sample of massive sulphides was prepared from core rejects of eleven holes which intersected the B4-7 zone. The Lakefield Research assays on the composite sample were higher than the original assays.

Original Assay	0.94% Ni	0.63% Cu
Lakefield Research	1.09% Ni	0.79% Cu

The metallurgical investigations by Lakefield Research of Canada Limited were limited in scope. They concluded that no tin mineralization was present in this mineral assemblage and that the pentlandite and violarite is finely interlocked within pyrrhotite.

The drill indicated undiluted geological mineral reserves of the B4-7 massive sulphide zone are calculated as 2,282,520 tons containing 0.87 percent nickel and 0.59 percent copper. These reserves are contained in two irregular bodies and to a vertical depth of 1000 feet below surface. Analysis of 1969 drill core from the B4-7 massive sulphide zone by Laminco in 1990 indicates the presence of significant cobalt (up to 0.09%) and platinum group metals up to 1.2 g Pd/t.

## Lincoln (Hull) Property

The main Lincoln property is located in the southwest corner of Gzowski Township, 2 km north of the CNR mainline, west of Gzowski Lake and 73 km northeast of Beardmore. All 1999 exploration activity has focussed on the central portion of claim TB 123360 (7 units) on the Lincoln North zone and Lincoln South zone, currently held by NWT Copper Mines Ltd. The company also controls 7 additional, contiguous claim blocks in the area, situated to the south, east and north of the main occurrence. Work during the 1999 field season included extensive stripping, prospecting, lithogeochemical sampling and geological mapping. Access to the occurrence is via the Kinghorn Road, which intersects Highway 11 7.5 km east of Jellicoe, north for approximately 87 km to what is known as the Emily Creek Road. The main showings are located a further 6 km north along the Emily Creek Road. Most of the current activity is located 100 to 200 m east of the road, along a 1 km north-trending line. However, two 1917-vintage exploration shafts were uncovered along the west edge of the right of way.

It is important to note that a contiguous, but totally separate claim group (i.e. TB 1205062 and TB 1205038), known as the South Lincoln gold property, lies south of the CNR mainline and the main Lincoln property. This ground was explored under a 1999 OPAP grant by Beardmore prospector N. Cox, one of the principles of NWT Copper Mines Ltd. However, it is not discussed in this report.

The earliest exploration on the Lincoln property occurred in 1916, at the start of the initial gold rush to the Tashota area (i.e. Beardmore-Geraldton area), following the completion of the national transcontinental railway (i.e. the CNR mainline) in 1913. In 1917, a 15 m, inclined shaft was sunk on a quartz vein system at what was then known as the "Hull Claims" (Hopkins 1917). NWT Copper Mines Ltd. conducted its initial, 1999 stripping and sampling program approximately 150 m east of this north shaft area, on what is termed the North zone (the north shaft is presently situated immediately west of Emily Creek Road). A private report written by P.E. Hopkins in 1928 (Chance 1975) indicates that Coniagas Mines Limited diamond-drilled 2 holes (holes CON 1 and CON 2, 1923), totalling 1004 feet, near the south shaft area. Discouraging results forced the company to drop the property. In 1928, Kipper Tashota Gold Mines Limited was formed to control the ground (Amukun 1977). A second, 10.5 m vertical shaft was sunk on what was thought to be the southern extension of the north shaft vein system (located east of Emily Creek Road). Hopkins mentions the presence of visible gold in both shafts and that an extensive channel sampling program was conducted under his direction across the property at this time (Kindle 1931). Kipper Tashota Gold Mines Limited was chartered in Ontario and renamed Lincoln Gold Mines Limited in 1936, according to a 1945 report by Hopkins (Amukun 1977). Extensive sampling of numerous hand trenches and test pits was conducted into the late 1930s. The ground remained in good standing until 1973, when it was restaked by J.F.M. Croteau (Amukun 1977). In 1975, Derry, Michener and Booth completed an 11-hole Winkie diamond-drill program totalling 718 feet, detailed geological mapping, and ground magnetometer surveys for Westburne-G.P. Drilling Ltd. Seven holes were diamond-drilled near the north shaft and the remaining 4 holes were located near the south shaft (holes 75-1, 75-2, 75-10, 75-11). This was done to test the strike and dip extensions of the known, gold-bearing zones delineated by surface sampling (Chance 1975). In 1998, G.M. Stott of the Ontario Geological Survey, as part of an ongoing, five-year project, conducted a reconnaissance geology and structural mapping program in the Willet-Gledhill lakes area, which covered the Lincoln ground (Stott et al. 1998). NWT Copper Mines Ltd. acquired the property by staking late in 1998 and completed an extensive surface stripping and sampling program at the north and south shaft zones during the 1999 field season. Timber-cutting operations by Buchanan Forest Products Ltd. in 1998 has, for the first time, provided access to this portion of the Onaman-Tashota Belt.

The Lincoln property is situated within mafic metavolcanic rocks of the north-central portion of the Onaman-Tashota Belt, which is, in turn, part of the eastern Wabigoon Subprovince. The immediate vicinity of the property, north of the CNR rail line, is dominated by three, coeval, late-tectonic felsic plutons, namely the Robinson, Deeds and Gzowski plutons.

Stott et al. (1998) indicates that each of these intrusive bodies has produced a strain aureole in the surrounding metavolcanic rocks. The Lincoln occurrence is situated within the alteration horizon of the Gzowski pluton (dated at  $2698 \pm 1$  Ma) (Stott et al. 1998), which is located only 3 km east of the property. Iron carbonate-sulphide



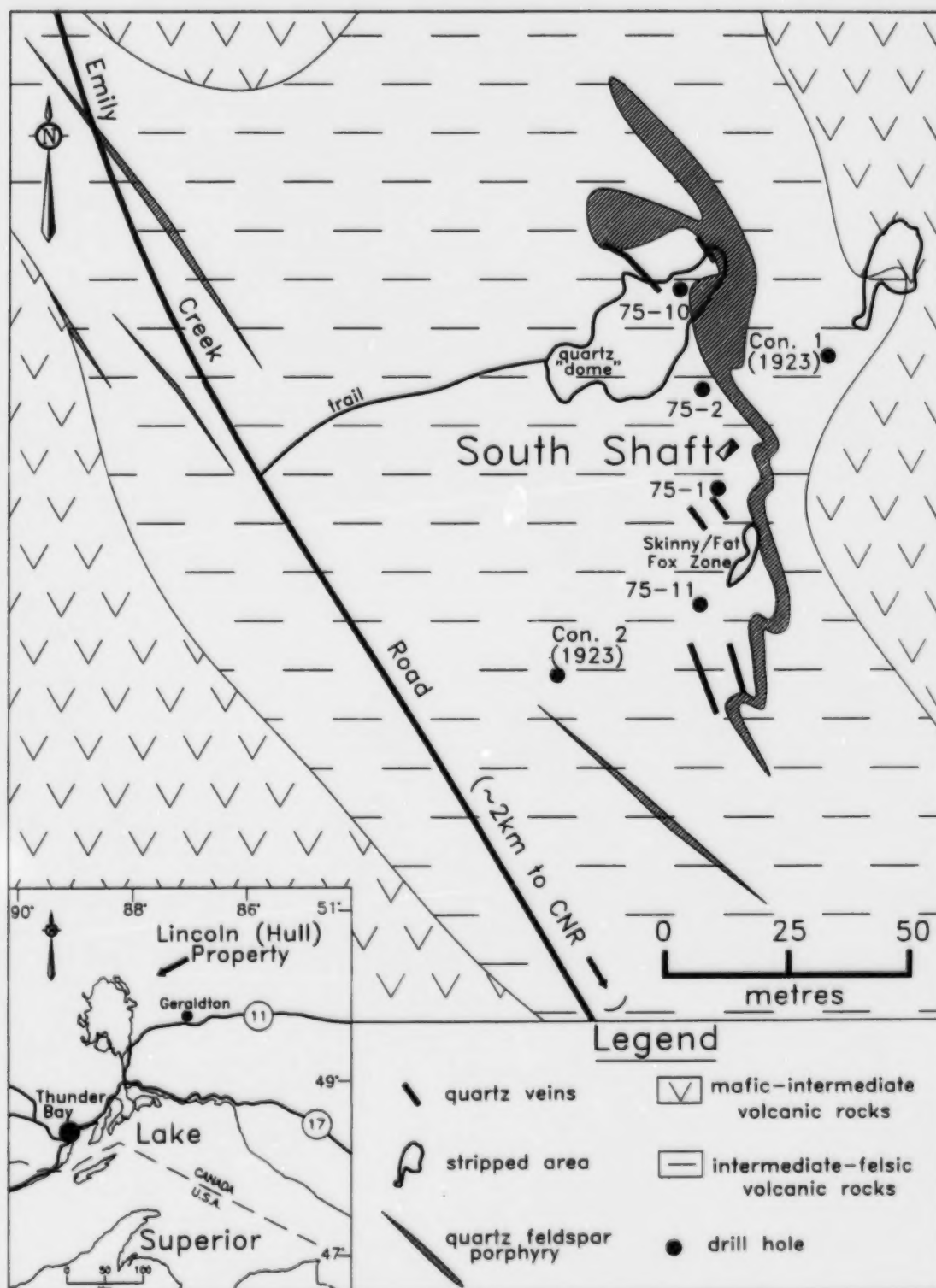


Figure 4. Generalized Geology of the Lincoln (Hull) Property.

## Thunder Bay North (Beardmore-Geraldton) District--1999

enrichment is typical of these high-strain zones (Stott et al. 1998) and is most prominently displayed at NWT Copper Mines Ltd.'s North zone. Feldspar porphyry dikes, potentially related to the nearby Gzowski pluton, host the most significant and consistent gold mineralization displayed at the Lincoln South zone. Log information from the Derry, Michener and Booth's 1975 drill program at the Lincoln North zone shaft and Lincoln South zone shaft areas describe the alteration encountered (Chance 1975). Highly carbonatized and silicified sections containing up to 15% disseminated pyrite (with an average of 3 to 5%), which occur in both the chlorite-rich mafic metavolcanic rocks and the feldspar porphyry dikes, correlate with the best gold assay results (i.e. as high as 0.90 ounce per ton gold). In terms of structure observed on the property, both the shearing and foliation within the metavolcanic rocks and the feldspar/quartz-feldspar porphyry dikes generally strike north with steep, easterly dips. Stott et al. (1998) mapped two, major fault zones in the area. The most proximal, called the Robinson fault, occurs 2 km northeast of the Lincoln group. However, it appears to have had little or no effect on the local rocks.

P. Chance (1975) of Derry, Michener and Booth provides a detailed description of the property geology:

Most of the property is underlain by north-south trending andesitic to basaltic volcanic rocks which strike approximately 335° and dip steeply to the northeast. Attitude determinations on pillows indicate the flowtops face east. A tightly folded band of weakly carbonatized acid pyroclastics, up to 200' wide at the South shaft, appears to pinch out about 600' southeast of the North shaft. One or more narrow bands of similar pyroclastics were noted near the North shaft and a narrow, intensely carbonatized zone is well exposed about 400' to the east of this shaft. Chlorite schists and amphibolites predominate to the east of the larger north-south trending belt of pyroclastics while flows with occasional pillows are more common to the west.

A reddish medium-grained quartz-porphyry dike up to 30' wide located about 20' east of the North shaft was traced by drilling and outcrop for 230' along strike. The new "East" vein was discovered in this porphyry dike. A second feldspar porphyry dike was observed in outcrop and in two drill holes at the South shaft. This dike is dragfolded, strikes north-south, dips steeply and averages about 7 or 8' in width. Holes 75-2 and 75-10 intersected this dike over a core length of up to 40'; presumably a section thickened by minor folding.

Program staff visited both the North and South zones at the Lincoln property during the 1999 field season. The North-zone stripped area is a north-trending (i.e. striking 340°), moderately sheared, chlorite-rich lapilli tuff containing 2 to 5% pyrite as seams and disseminated grains. Highly deformed but conformable quartz veins and veinlets, and rusty Fe-carbonate alteration are prominent across the outcrop. Gold values from grab and channel samples are erratic but exceed 1 ounce per ton gold at one location (see sample compilation chart). Within the north shaft, along the Emily Creek Road, visible gold associated with 2 to 10% pyrite and some tourmaline was noted. In the South zone, stripping was conducted over what is known as the "quartz dome", which is a prominent "knob" covered by a series of flat lying veins. Below this thin veneer of quartz, the outcrop consists of strongly sheared mafic tuffs and pillowed basalts, intruded by a second generation of quartz (striking 135 to 140°) and, more importantly, a series of feldspar porphyry dikes from 2 to 3 m wide. Alteration includes silicification, chlorite and tourmaline. Approximately 60 m south of this stripped area, 2 zones, known as the "Skinny" and "Fat Fox" occurrences, were uncovered by the company in hand stripping (the south shaft lies between the "quartz dome" and these occurrences). Here, north-trending quartz-feldspar porphyry dikes have intruded silicified mafic metavolcanic host rocks. On average, these dikes contain 2 to 5% disseminated pyrite and up to 1% chalcopyrite. One chip sample collected by NWT Copper Mines Ltd. averaged 0.975 ounce per ton gold over 2.74 m (9 feet) (N. Cox, NWT Copper Mines Ltd., personal communication, 1999). Extensive power stripping and detailed sampling concentrated along these feldspar/quartz-feldspar porphyry dikes are planned for the 2000 field season.

A compilation of significant assay results across the main Lincoln property, taken throughout its exploration history, is given below:

Sample Location	Gold Assay (g/ton)	Description	Sample Source
South Shaft Area	3.0 to 4.5 g/t over 19.8 m (65 ft.)	Channel Samples – quartz veins/metavolcanic	P.E. Hopkins (1917)
North Shaft	42.0 g/t over 1.52 m (5 ft.)	Channel Sample – quartz vein	P.E. Hopkins (1917)
South Zone (Quartz Dome)	31.7 g/t over 2.04 m (6.7 ft.)	Channel Sample – quartz vein/mafic metavolcanic	P.E. Hopkins (1920s)
South Shaft Area (Hole 75-1)	4.5 g/t over 4.57 m (15 ft.)	Diamond Drill Core – chloritic metavolcanic schist	Derry, Michener and Booth (1975)
South Shaft Area (Hole 75-2)	4.5 g/t over .91 m (3 ft.)	Diamond Drill Core – feldspar porphyry dike	Derry, Michener and Booth (1975)
North Shaft Area (Hole 75-5)	21.5 g/t over .91 m (3 ft.)	Diamond Drill Core – quartz vein	Derry, Michener and Booth (1975)
North Shaft	4.5 g/t over 2.44 m (8 ft.)	Chip Sample – quartz vein	NWT Copper Mines Ltd. (1999)
North Shaft	53.5 g/t	Grab Sample – quartz vein	NWT Copper Mines Ltd. (1999)
South Shaft Area (Skinny Fox Zone)	5.57 g/t over 2.74 m (9 ft.)	Chip Sample – mafic volcanic/quartz feldspar porphyry dike	NWT Copper Mines Ltd. (1999)
South Shaft Area (Fat Fox Zone)	30.3 g/t over 2.74 m (9 ft.)	Chip Sample – quartz feldspar porphyry dike	NWT Copper Mines Ltd. (1999)
South Zone (East of Quartz Dome)	67.2 g/t	Grab Sample – quartz vein/metavolcanic	NWT Copper Mines Ltd. (1999)
South Zone (25 m East of Quartz Dome)	5.7 g/t	Grab Sample – feldspar porphyry	Ontario Geological Survey (1999)
South Shaft Area (Skinny Fox Zone)	2.2 g/t	Grab Sample – quartz feldspar porphyry	Ontario Geological Survey (1999)
South Shaft Area	15.42 g/t over 3.5 m (11.5 ft.)	Chip Sample – feldspar porphyry, mafic volcanic/quartz	C. Bowdidge, Consulting Geologist (1999)
South Shaft Area	48.27 g/t over .55 m (1.8 ft.)	Chip Sample – feldspar porphyry	C. Bowdidge, Consulting Geologist (1999)

## Linsey Bay Copper-Nickel-Cobalt Property

The Linsey Bay copper-nickel-cobalt property is located 109 km north of Armstrong, Ontario. Seven copper-nickel occurrences are located east of Linsey Bay of Shabuskwia Lake, and west of Ficht Lake. The property consists of five unpatented mining claims, TB 1239804 to 1239808, totalling 80 claim units. The property is accessible by aircraft from Armstrong. A new, Buchanan Forest Products Ltd. logging road, when complete, will end approximately 20 km southeast of Linsey Bay. K. Fenwick and D. Leishman, both of Thunder Bay, are the property owners.

Leitch Gold Mines Ltd., The Consolidated Mining and Smelting Company of Canada, Limited and McIntyre Porcupine Mines Ltd. initiated exploration programs in the area on three separate occurrences, starting in 1956. Leitch Gold Mines Ltd. (1956 and 1957) conducted line cutting, a ground magnetometer survey, a ground electromagnetic survey, trenching and diamond drilling on what is the most southwestern occurrence in the present claim group. This is a copper-nickel-cobalt occurrence originally discovered by N. Smith, now called the Leitch occurrence. Goldpost Resources Incorporated conducted an airborne electromagnetic (VLF-EM) and magnetic geophysical survey in 1988, covering the Leitch occurrence.

The Consolidated Mining and Smelting Company of Canada, Limited optioned claims from W. Ferring of Jellicoe and conducted trenching, sampling, line cutting, geological mapping, a ground magnetometer survey and diamond drilling (1956 and 1957) on what is termed the Gould Lake copper-nickel occurrence. This is located 1.3 km south of Gould Lake and 3.0 km northeast of the Leitch copper-nickel-cobalt occurrence. In 1961, Governor Gold Mines restaked the Gould Lake occurrence and undertook prospecting, stripping, trenching and sampling.

In 1956, McIntyre Porcupine Mines Ltd. optioned claims and a copper-nickel occurrence, held by J.C. Grayden of Beardmore and L.H. Farley of Nipigon, located approximately 3 km north-northeast of the Leitch occurrence and 0.75 km south of the East Arm of Linsey Bay. Geological mapping, ground magnetometer surveys and diamond drilling were conducted in 1956 and 1957 on 30 claim units.

## Thunder Bay North (Beardmore-Geraldton) District--1999

The Linsey Bay property is located in the English River Subprovince of the Superior Structural Province. The Linsey Bay-Shabuskwia Lake area is underlain by undifferentiated felsic intrusive rocks, biotite and biotite-hornblende granite, hornblende granite and hornblende quartz diorite, as well as migmatized metasedimentary rocks, arkose and greywacke. These rocks are, in turn, intruded by anorthosite, anorthositic gabbro and gabbro. Minor "slivers" of mafic metavolcanic rocks occur to the south in the Musgrove Lake area and represent a portion of the Attwood Lake metavolcanic belt to the east (Thurston et al. 1969).

The Aguta Moraine, a major surficial feature, is located east of Shabuskwia Lake (Thurston et al. 1969). There has been no detailed government mapping in the Linsey Bay-Shabuskwia Lake area. The seven known copper-nickel occurrences are as follows (Fenwick 1999):

- |  |          |            |
|--|----------|------------|
| 1. Gould Lake - Consolidated Mining and Smelting Co. | South #1 | TB 1239805 |
| 2. Gould Lake - Consolidated Mining and Smelting Co. | South #2 | TB 1239805 |
| 3. Gould Lake - Consolidated Mining and Smelting Co. | North    | TB 1239806 |
| 4. Gould Lake - Governor Gold Mines Ltd. Co.         |          | TB 1239805 |
| 5. Gould Lake - Miron Occurrence                     |          | TB 1239805 |
| 6. East Arm - McIntyre Porcupine Mines Ltd.          |          | TB 1239807 |
| 7. Linsey Bay - Leitch Gold Mines Ltd.               |          | TB 1239804 |

The extent of sampling of these occurrences was very limited. Leitch Gold Mines described 3 grab samples taken from gabbro on the Linsey Bay property (#7) that assayed 0.52 to 2.3% Cu, 0.38 to 0.62% Ni and 0.21 to 0.26% Co. Platinum and palladium values are unknown.

Governor Gold Mines identified assay values of up to 1.87% Cu and 0.18% Ni in 3 trenches in an anorthosite unit and hornblende-mica schist.

McCombe (1961) described the mineralization on the Governor Gold Mines Gould Lake property:

The mineralization consists of chalcopyrite, pyrrhotite, pentlandite and some minor amounts of pyrite. It occurs as irregularly distributed blebs and as disseminations in the anorthosite and the hornblende-mica schist. Diorite in contact with pegmatite in Pit No. 1 is heavily mineralized in chalcopyrite.

The pyrrhotite and contained nickle mineral or minerals appear to be primary in origin with the chalcopyrite secondary and replacing the pyrrhotite.

### Pit No. 1

In this pit scattered chalcopyrite and pyrrhotite mineralization is found in the anorthosite and the hornblende-mica schist. Strong chalcopyrite mineralization occurs over a width of eight inches in the chlorite in contact with the pegmatite.

A grab sample of average mineralization and not including any of the eight inch width of strong chalcopyrite returned: Copper 0.71% Nickle 0.14%

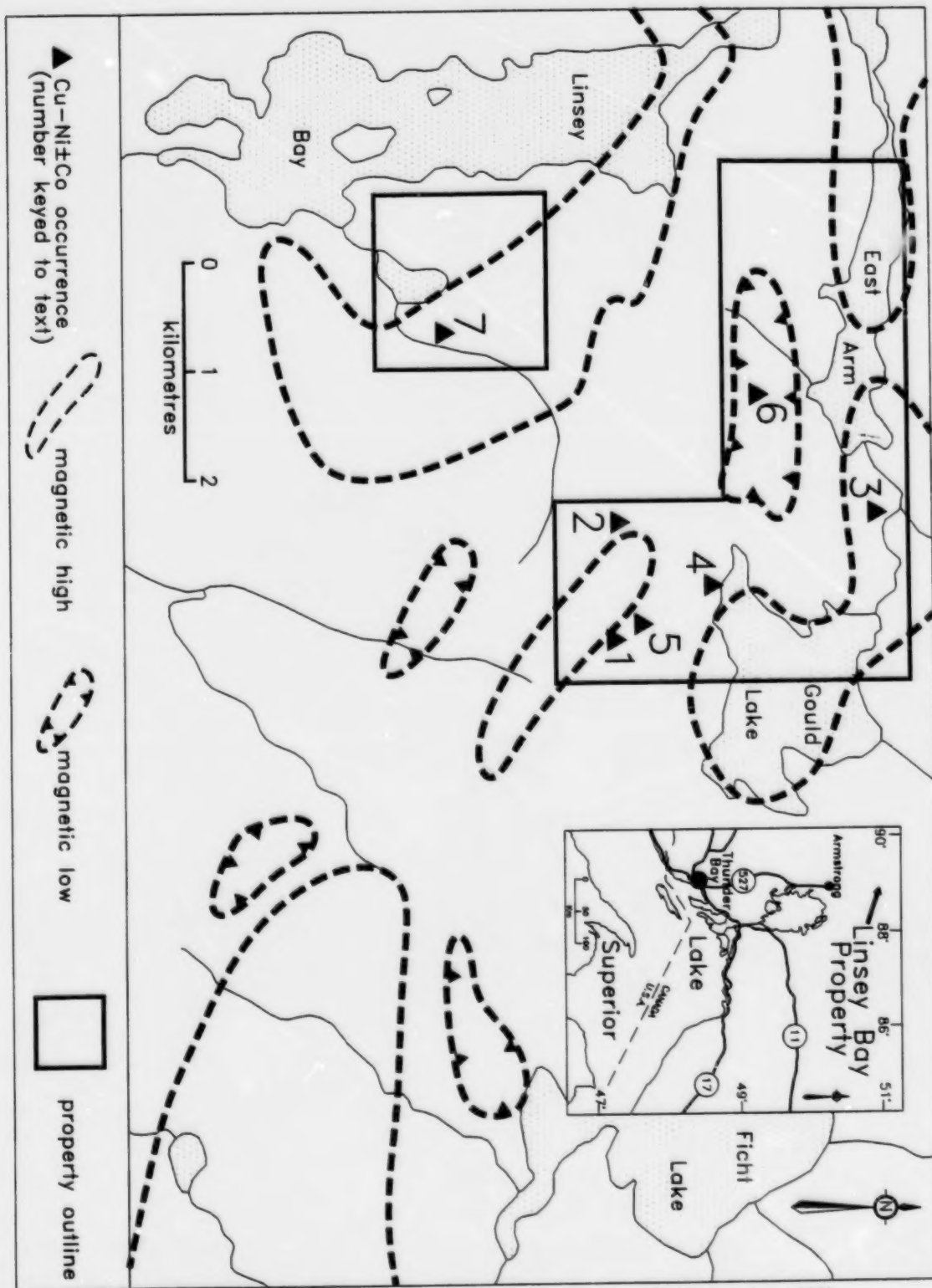


Figure 5. Linsey Bay Copper-Nickel-Cobalt Property (after Fenwick 1999).



## Thunder Bay North (Beardmore-Geraldton) District--1999

### Pit No. 2

Mineralization in this pit consisted of disseminated chalcopyrite and pyrrhotite occurring in both the anorthosite and the hornblend-mica schist.

A grab sample of representative material returned: Copper 0.78% Nickel 0.02%

### Pit No. 3

The best mineralization in this pit occurred along the anorthosite diorite contact on the north side of the pit. Here the Chalcopyrite and pyrrhotite are irregularly distributed as blebs and disseminations. In the hornblend-mica schist both minerals are finely distributed with some good sized blebs of nearly massive chalcopyrite.

A representative grab sample of the mineralization in the anorthosite returned: Copper 1.87% Nickel 0.18%

A grab sample of the hornblend-mica schist and excluding any of the massive chalcopyrite returned: Copper 0.32% Nickel 0.02%

The most interesting samples of copper mineralization are reported to be located one claim length northwest of Occurrence #4 (McCombe 1961).

Leitch Gold Mines (1957) described a 27-foot section of diamond-drill hole #2 as containing "massive hornblende and feldspar with heavy chalcopyrite and pyrrhotite disseminated throughout (medium to coarse grained)" at Occurrence #7, Linsey Bay.

Consolidated Mining and Smelting Company of Canada, Limited (1957) described the geology for Occurrences #1, #2 and #3 as consisting of pyroxene and biotite gneisses associated with pegmatite. Coarser portions of the pyroxene gneiss were noted to contain disseminated chalcopyrite and nickel-bearing pyrrhotite (Koehler 1957).

It appears that the copper-nickel occurrences are located on a 600 to 700 m thick, anorthositic gabbro sill that can be traced for 25 km from Weese Lake, southwest through Luella Lake and west to Shabuskwia Lake and the area of the occurrences. The occurrences are coincident with high magnetic anomalies (Fenwick 1999).

There are no records of sampling or assaying for PGE on any of the 7 occurrences. Only at the Leitch occurrence were samples assayed for cobalt. Prospecting, reconnaissance mapping of the property and resampling of the 7 occurrences will be undertaken by the claim owners.

## **Wobbegong Property**

The Wobbegong property is located in the southwest portion of Oboshkegan Township, approximately 7.5 km south of the CNR mainline at Tashota Station and 63 km northeast of Beardmore. The property consists of 51 contiguous claim units in 4 blocks (TB 1232030, TB 1232747, TB 1232748 and TB 1233379) bordering Shed Lake on the southwest, and including all of Barn Lake. The claims are held by consulting geologist S.N. Roach of Ottawa. Since initial staking in 1998, an extensive amount of exploration work has been conducted. This includes detailed mapping, sampling and ground geophysical surveys over three cut grids, funded by a 1999 OPAP grant. Access to the property is via the Kinghorn Road which intersects Highway 11 7.5 km east of Jellicoe, north for approximately 80 km, to the Branstrom Lake Road. The centre portion of the claim group is reached by travelling 6 km to the northeast along this secondary, logging road.

Limited exploration work has been conducted over the Wobbegong property, relative to the large area immediately north of the claim group, which has seen extensive historical activity dating from the early 1920s. Cameco Gold Inc. has been the most active player in the region since 1996 and continues with a multiphase exploration program on its Knucklethumb Lake (Onaman River) gold project, situated 2 km north of Shed Lake. Most of the past recorded work on the Wobbegong Group involved ground and airborne geophysical surveys conducted by Noranda Exploration Co. Ltd. and Amax/Canamax Resources Inc. between 1976 and 1988. These were restricted to the northwest portion of the property (i.e. claim TB 1232030). Amax completed one 363-foot diamond-drill hole in

1980, to test an airborne geophysical anomaly along the western boundary of claim TB 1232030. The diamond-drill hole log indicates sections of highly altered (e.g. chlorite/sericite) and mineralized (e.g. pyrite/pyrrhotite) felsic tuff, quartz-feldspar porphyries and coarse pyroclastic breccias, associated locally with strongly carbonaceous graphitic horizons (Resident Geologist's files, Thunder Bay North (Beardmore-Geraldton) District, Thunder Bay).

The 1988 Tashota-Geraldton-Longlac Ontario Geological Survey-Aerodat Airborne Geophysical Survey (OGS 1988) covering this area indicated two strong, co-incident, northeast-trending, electromagnetic-magnetic anomalies. These were the focus of much of the 1999 field season activity.

Rocks underlying the Wobbegong property occur within the north-central portion of the Onaman-Tashota metavolcanic belt, which is part of the eastern Wabigoon Subprovince.

Roach (1999) describes the local geology as follows:

The metavolcanic sequence is bimodal with a sequence of iron to magnesium-rich tholeiitic basalts and calc-alkaline dacite to rhyolite. The chemical and clastic metasediments are usually found at the top of a metavolcanic stratigraphy and occur as interformational units within the mafic metavolcanics. The KL and Wobbegong faults are the principal structures that transect the rocks underlying the property. The Tashota-Nipigon Mine (Au) and Headway-Coulee Mine (Ag-Zn) (south of the property) are spatially associated to a series of complex shears and fractures that characterize the KL fault. The system extends for at least 15 km in a north to northeast direction.

Three areas were targeted and grids were developed to test the geophysical anomalies. Grid A is located in the northern portion of claim TB 1232030, Grid B lies south of Shed Lake along the centre part of claim TB 1232746 and Grid C is situated at the south end of Barn Lake on claim TB 1232747. Claim TB 1233379 encompasses the remaining portion of the Aerodat anomaly along a northeast trend. Detailed geological mapping, VLF-EM and magnetometer geophysical surveys, and lithogeochemical and humus sampling were conducted.

Roach (1999) provides a synopsis of each of these areas:

#### Grid A – Au-(Pb-Zn) Target

The proposed target lies south of a pyritic, phyllic-advanced argillic alteration cap that is up to 400 meters wide. This alteration cap coincides with a circular-shaped magnetic low that is interpreted to be a QP-QFP (quartz porphyry - quartz-feldspar porphyry) dome. Although there is no outcrop exposure on Grid A, the magnetic survey (conducted) clearly defines mafic metavolcanic stratigraphy in the northern part of the grid with felsic metavolcanics in the remaining part. The metavolcanics are cross-cut by two fault systems. The (anomalous) VLF-EM zone has been outlined for 800 meters. A humus orientation survey was successful in outlining a significant Au anomaly (125 ppb Au) coinciding with the VLF-EM zone. A gold-bearing or an auriferous polymetallic quartz-(carbonate) vein/stockwork structure hosted in a graben feature within the felsic metavolcanics is construed.

#### Grid B – Zn-Cu-Ag-(Au) Target

The geological survey of this area did confirm a felsic stratigraphy of coarse pyroclastics for at least a 1.10 km strike length and >100 m thick. The felsics are predominantly fragment supported (i.e. monolithological quartz-eye and feldsphyric crystal tuff fragments) with a general fining from west to east. A sodium-depleted amphibole + chlorite + carbonate + magnetite alteration zone has been outlined for at least 500 meters and is up to 30 meters wide. An exhalative horizon is proximal to the alteration. The most significant showing is the Jeremi Showing where a sulphide facies (bedded massive pyrite, chert and graphite) attained a value of 180 ppb Au and 484 ppm As.

Two parallel, northeast trending VLF-EM zones have been outlined. Anomaly D has been outlined for 1.10 km and both these anomalies are open to the southwest and faulted to the northeast. Anomaly D coincides with the exhalative horizon, flanking a strong magnetic anomaly and anomaly E lies in an area of no outcrop with a moderate magnetic correlation.

All these features suggest a proximal VMS environment.

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## Grid C - Au-Ag-Cu-Pb-Zn Target

Geological mapping and sampling were successful in discovering a sulphide zone (i.e. Josef Showing). The showing area is located in the southernmost part of the northeasterly trending airborne anomaly in Barn Lake. The Josef Showing area has been outlined for 85 meters and is between 10 and 15 meters wide. The host rock consists of silicified and sulphidized arenaceous and argillaceous metasediments and mafic pillow flows/volcaniclastics. Only 6% of the airborne anomaly has been explained, although no significant Au and base metals were encountered on the Josef Showing.

The strategic location of this property should be emphasized. Its southern proximity to the Cameco Gold Inc. Knucklethumb Lake gold project, and the fact that the Wobbegong group occupies the same package of felsic volcanic rocks is notable. Also significant are the strong Aerodat airborne geophysical anomalies; in particular, the Barn Lake zone (Grid C - Josef Showing), most of which has yet to be ground tested and where no past exploration work is known. In addition, lake sediment sampling by W. Yzerdraat on Dyer Lake at his Metcalfe Lake property produced results as high as 200 ppb Au, the source of which has yet to be discovered. This area lies only 3 km west of the Wobbegong property.

Table 4: PGM targets in the Thunder Bay North (Beardmore-Geraldton) District in 1999

Property/Deposit Name (Location)	Owner	Geology/Mineralization	Age	Reserves/Assays
Cote Float (Geraldton)	Colin Bowdidge	Disseminated cpy, po in medium- to coarse-grained gabbro		>1 gm/t PGE
Eva-Kitto Townships (Lake Nipigon)	Ken Fenwick - L. Holt - D. Leishman	Ultramafic intrusion - 6 km (in diameter) ring dike or cone sheet - peridotite to ol. gabbro	Proterozoic	PGE-TBD
Final Lake (Jellicoe)	Nolan Cox	Ultramafic intrusion - limits poorly defined	Archean	>1 gm/t PGE (grab sample)
Jacobus Deposit (Beardmore)	N.W.T. Copper Mines (Nolan Cox)	2 to 5% disseminated cpy, po, py in Pinel Lake gabbro intrusion	Archean	1 MT @ 0.94% Cu+Ni - low to unknown PGE
Juneau Lake Deposit (Lake Nipigon)	Landore Resources Inc. - Wing Resources (Claude Larouche)	Massive sulphide consisting of po with minor cpy, po, pent., mag. associated with large anorthositic gabbro sill	Archean	2.2 MT @ 0.87% Ni, 0.59% Cu, prel. PGE assays >1 gm/t
Lavoie Lake Deposit (Lansdowne House)	Spider Resources Inc. - KWG Resources Inc. (Neil Novak)	Disseminated cpy, po, py in layered anorthositic gabbro intrusion	Archean	14.6 MT @ 0.58% Cu, 0.37% Ni, PGE?
Linsey Bay Property	Ken Fenwick - D. Leishman	7 Cu-Ni occurrences on property, disseminated cpy, po, py in 600 m x 25 km anorthositic sill	Archean	2.3% Cu, 0.62% Ni, 0.26 Co, PGE? (grab samples)
Norton Lake	Open	Massive po, py in 8 m wide band in synform of volc. Sequence-gabbro	Archean	1 MT @ 0.72% Ni, 0.56% Cu, PGE?
Standingstone Lake (Beardmore)	John Ternowesky	Semi-massive po, py as lenses in mafic volc.	Archean	>1 gm/t PGE (grab samples)
Sim Lake (Armstrong)	Whalen Resources (Jamie Wheeler)-Doug Thibault-Basil Smith	1 to 5% disseminated cpy, py, po in medium- to coarse-grained gabbro, some pegmatoidal/bx phases	Archean	>1 gm/t PGE (grab samples)
Tyrol Lake (Beardmore)	Pifher Resources Inc. (Gary Conn)	Mafic-ultramafic intrusions	Archean	Pending



## RECOMMENDATIONS FOR EXPLORATION

Platinum group metal (PGM) mineralization is associated with late to early Pre-ambrian mafic and ultramafic rocks in the Lake Nipigon-Lake Superior area. Specifically, gabbro, peridotite and pyroxenite containing up to 5% fine-grained, disseminated pyrrhotite, chalcopyrite and pentlandite should be investigated. Pegmatoidal or breccia textures tend to concentrate disseminated sulphide minerals and PGM. Sheared, semi-massive to massive sulphides can also concentrate PGM. Chromite can also concentrate and be associated with PGM in layered ultramafic rocks or as lenses in Alpine-type peridotites. Geophysical surveys indicate potential mineralized mafic to ultramafic rocks as moderate to strong magnetic and electromagnetic anomalies. Available airborne geophysical data should be systematically researched for potential targets.

Recent mapping by the OGS identified numerous, mafic-ultramafic intrusive bodies in the west Onaman and Toronto lakes area. Stott et al. (1995) identified the presence of dioritic and gabbroic rocks both north and south of Conglomerate Lake, west of Onaman Lake. Sulphide mineral (primarily pyrite and chalcopyrite) showings have been documented from limited, past exploration work in the 1970s. The OGS indicated that metavolcanic rocks in the Toronto Lake area "are intruded by ultramafic and mafic dikes, sills and stocks composed of peridotite, pyroxenite, gabbro and anorthositic gabbro". The OGS report further states that "Copper and nickel are associated with an anorthositic gabbro sill that extends from Toronto Lake to west of Ketchikan Lake". The Juneau Lake deposit, which contains 2.2 million tons grading 0.87% Ni and 0.59% Cu, is located within this unit. The PGM potential of both these areas has yet to be properly assessed in detail.

Specific properties/intrusions that warrant investigation are mafic (gabbro) or ultramafic (pyroxenite-peridotite) and can be Proterozoic or Archean in age:

- 1) Eva-Kitto townships
- 2) Standingstone River
- 3) Final Lake
- 4) Sim Lake
- 5) Jacobus Deposit
- 6) Juneau Lake Deposit
- 7) Deeds Creek
- 8) Tyrol Lake
- 9) Geraldton Gabbros
- 10) Caribou Lake
- 11) Lavoie Lake
- 12) Norton Lake

On a reconnaissance scale, the Quetico-Wabigoon Subprovince boundary, that lies south of Highway 11 in the Beardmore-Jellicoe region should be examined. This area encompasses the eastern extension of the Quetico Gneiss belt and has a similar geological setting to that containing the recently discovered PGM-bearing, mafic intrusive bodies near the town of Atikokan, west of Thunder Bay. The 1960 government regional airborne magnetometer survey maps (Ontario Department of Mines-Geological Survey of Canada 1960) can be used to locate magnetic highs that may be related to similar mafic intrusive bodies. This geophysical information should be utilized in conjunction with the regional lake sediment and water geochemical reconnaissance data collected by the Geological Survey of Canada and published in two open file reports (i.e. OF 2177 in 1990 and OF 2360 in 1991). Sites indicating anomalous to highly anomalous PGM-related metals, namely copper, nickel, cobalt and chromium, should be studied. Additionally, recent timber-cutting activities, including those scheduled for the year 2000, will greatly enhance the access into this underexplored region.

## **Gold in Legault Township**

The south portion of Legault Township is underlain by greywacke and discontinuous iron formation, which have been intruded by east-trending diorite sills and north to northeast-trending diabase dikes (Mackasey 1973). A grab sample that assayed 0.03 ounce per ton gold was collected by OGS staff from an outcrop 700 m east of Patsy Lake, in south-central Legault Township. This sample was a weakly foliated and silicified greywacke with approximately 1% disseminated, fine-grained pyrite. It is worth noting that this sample site, which is currently open to staking, is in the vicinity of a low magnetic anomaly (OGS map 81323), adjacent to a flexure in a regional lineament (Mackasey 1973), and is without previous, recorded exploration work.

## **OGS ACTIVITIES AND RESEARCH BY OTHERS**

G.M. Stott completed year five of a multi-year geological mapping program in the Onaman-Tashota area. The Marshall Lake area was mapped in 1999.

N. Culshaw, Dalhousie University, conducted a Lithoprobe study of the Humboldt Bay strain zone.

K. Straub and H. Gibson, Laurentian University, initiated a physical volcanology and alteration study of volcanogenic massive sulphide mineralization at Marshall Lake, in conjunction with G. Stott's research.

K. Tomlinson and M. Leshner, Laurentian University, and G. Stott, OGS, conducted a Sm/Nd isotopic study of volcanic rocks in the Onaman-Tashota belt.

## **ACKNOWLEDGEMENTS**

D. Laderoute edited the manuscript. Prospectors and company personnel are thanked for their contributions.

Table 5. Mineral deposits not being mined in the Thunder Bay North (Beardmore-Geraldton) District in 1999.

Abbreviations					
AF .....	Assessment Files	MLS .....	Mining Lands, Sudbury		
CMH .....	Canadian Mines Handbook	MR .....	Mining Recorder		
GR .....	Geological Report	NM .....	The Northern Miner		
MDC .....	Mineral Deposit Circular	OFR .....	Open File Report		
MDIR .....	Mineral Deposit Inventory record	PC .....	Personal Communication		

Deposit Name/ NTS	Commodity	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
Brookbank (42E12/NW)	Au	1.3 Mt @ 0.26 opt Au	Ontex Resources Ltd.	CMH 1995-96, p.245	Reserves defined by diamond drilling 1983-88. Gold zones diamond drilled 1999
Goss Lake (52P9/SW)	Au	300 000 T @ 0.23 opt Au to 60 m depth	Ayrex Resources Ltd./Tandem Resources Ltd.	CMH 1995-96, p.50	Last active 1988.
Headway Coulee (42L4/SE)	Zn, Ag	250 000 T @ 4.44% Zn, 1.32 opt Ag	Goldbrook Explorations Inc.	OFR 5630, p.41	Diamond drilling and stripping – Big Mac zone 1995. Geophysics 1997.
Howells Lake (52P10/SW)	Au	83 000 T @ 0.07 opt Au (+1.37% antimony) and 660 000 T (+3.1% antimony) with erratic Au values	Homestake Canada Inc.	OFR 5926, p.68	Last active in 1988.
Jacobus (42E13/SE)	Cu, Ni	1 Mt @ 0.94% Cu-Ni	NWT Copper Mines Limited	CMH 1995-96, p.275	Most recent work diamond drilling by SEG in 1993. Deposit open down plunge.
Juneau Lake (42L5/SW)	Ni, Cu, PGE	2.2 Mt @ 0.87% Ni, 0.59% Cu	Wing Resources- Landore Resources Inc.	OFR 5630, p.41	Stripping, mapping, sampling 1998.
Lavoie Lake (43D5/NE)	Cu, Ni	14.6 Mt @ 0.58% Cu, 0.37% Ni	Spider Resources Inc.-KWG Resources Inc.	OFR 5926, p.101	Last active 1992. Mineral inventory defined by diamond drilling. Compilation 1995.
Lynx Canada (42L4/SE)	Cu, Ag	25 000 T @ 4.0% Cu, 300 000 T @ 2.0% Cu, 1.0 opt Ag	Goldbrook Explorations Inc.	OFR 5630, p.41	Diamond drilling and stripping – Big Mac zone 1995.
Magnet Consolidated Mine (42E11/NE)	Au	150 700 T @ 0.38 opt Au 1 082 340 T @ 0.34 opt Au	Roxmark Mines Limited/Beaurox Mines	CMH 1995-96, p.330	U/G development in 1982-87.
Marshall Lake (42L5/NE)	Cu, Zn, Ag, Au	1.22 Mt @ 3.2% Zn, 0.94% cu, 2.2 opt Ag	Giant Gripp Mines	CMH 1995-96, p.275	Diamond drilling 1996-97.

## Thunder Bay North (Beardmore-Geraldton) District--1999

Deposit Name/ NTS	Commodity	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
Norton Lake (42M14/NW)	Ni, Cu	1.0 M T @ 0.72% Ni, 0.56% Cu		OFR 5926, p.136	Last active 1987.
Paulpic (42L4/NE)	Au	200 000 T @ 0.23 i opt Au	Canada Tungsten Inc.	OFR 5630, p.465	Last active 1987.
Zulapa (42M12/SW)	Au	700 000 T @ 0.28 opt Au to 200 m deep	Eabametoong First Nation	OFR 5926, p.208	

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**Ontario Geological Survey  
Regional Resident Geologist Program**

**Thunder Bay North Regional Resident Geologist (Sioux Lookout  
District)—1999**

**by**

**D. Farrow and G. Seim**

**2000**



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## **Thunder Bay North Regional Resident Geologist (Sioux Lookout District)—1999**

**D. Farrow<sup>1</sup> and G. Seim<sup>2</sup>**

<sup>1</sup> Acting District Geologist, Ontario Geological Survey

<sup>2</sup> District Geologist, Ontario Geological Survey

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### **INTRODUCTION**

In 1999, the Sioux Lookout District witnessed a sharp decrease in exploration activity, especially on the part of the junior exploration companies. Exploration activity remained focused in the southern part of the district, near Sioux Lookout. Notable exceptions are exploration programs by Romios Gold Resources Inc. at Akow Lake, in the North Caribou Lake greenstone belt, and Wolfden Resources Inc. at the former Pickle Crow gold mine, near Pickle Lake.

The sole operating mine in the district is the Musselwhite gold mine at Opapimiskam Lake. Placer Dome Inc. is the operator of the mine and experienced a successful year producing more than 200 000 ounces of gold. Extensive underground and surface exploration increased reserves at year-end to 13 824 000 tonnes grading 5.79 g/t gold.

A number of staff changes occurred in the Sioux Lookout office during 1999. D. Farrow joined the office as District Support Geologist in February. G. Seim accepted the position of District Geologist for the Timmins Region and left Sioux Lookout at the end of November, at which time D. Farrow took on the role of Acting District Geologist.

### **MINING ACTIVITY**

#### **Placer Dome North America Ltd. / TVX Gold Inc.**

##### **MUSSELWHITE MINE**

The Musselwhite Mine is located about 126 km north of Pickle Lake. Access to the mine site is by means of an all-weather airstrip on-site or via a 43 km, all-weather, single lane, gravel road connecting the mine site to the northern extension of Highway 599. The mine employs about 240 persons working on a two-week in, two-week out rotating schedule. Approximately 25% of the workforce is Aboriginal.

Gold at the Musselwhite Mine occurs principally in a sulphidized (pyrrhotite), garnet-amphibole-chert-grunerite-magnetite iron formation. The major ore zones occur in shallow-plunging, antiformal fold closures of minor folds within a large, complex fold structure. Sulphidization and quartz flooding occur along a well-developed, axial planar cleavage in the fold hinges. Access to the ore is by means of a ramp. A conveyor system is being considered to bring ore from the deeper levels of the mine to surface. A second, open pit operation to provide access to other near-surface ore is in the planning stages.

The mill is rated at 3300 tonnes per day, utilizing conventional crushing and grinding circuits feeding a carbon-in-pulp plant.

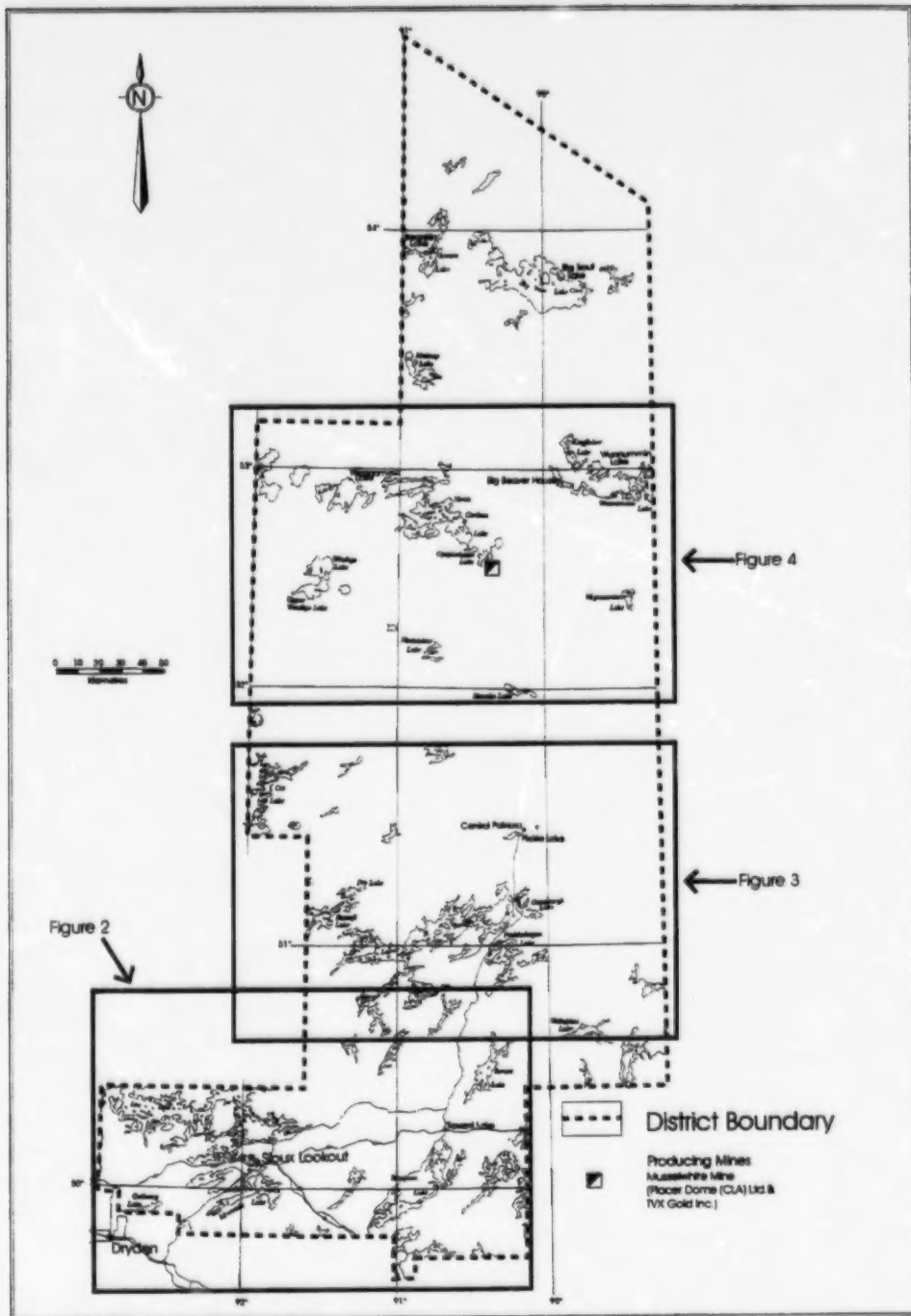


Figure 1. Producing mines and location map for the Sioux Lookout District.

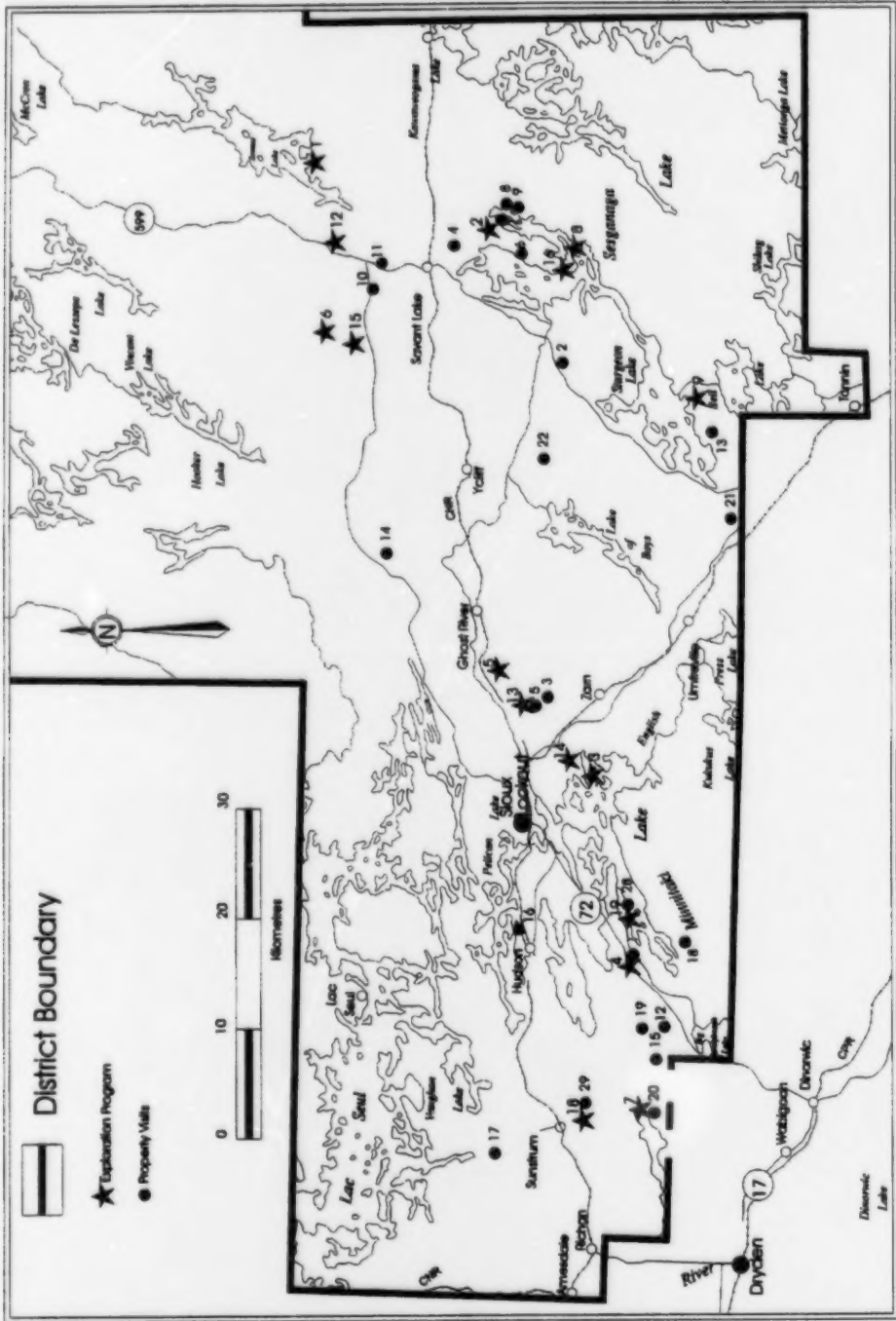


Figure 2. Exploration activity and property visits in the southern part of the Sioux Lookout District.

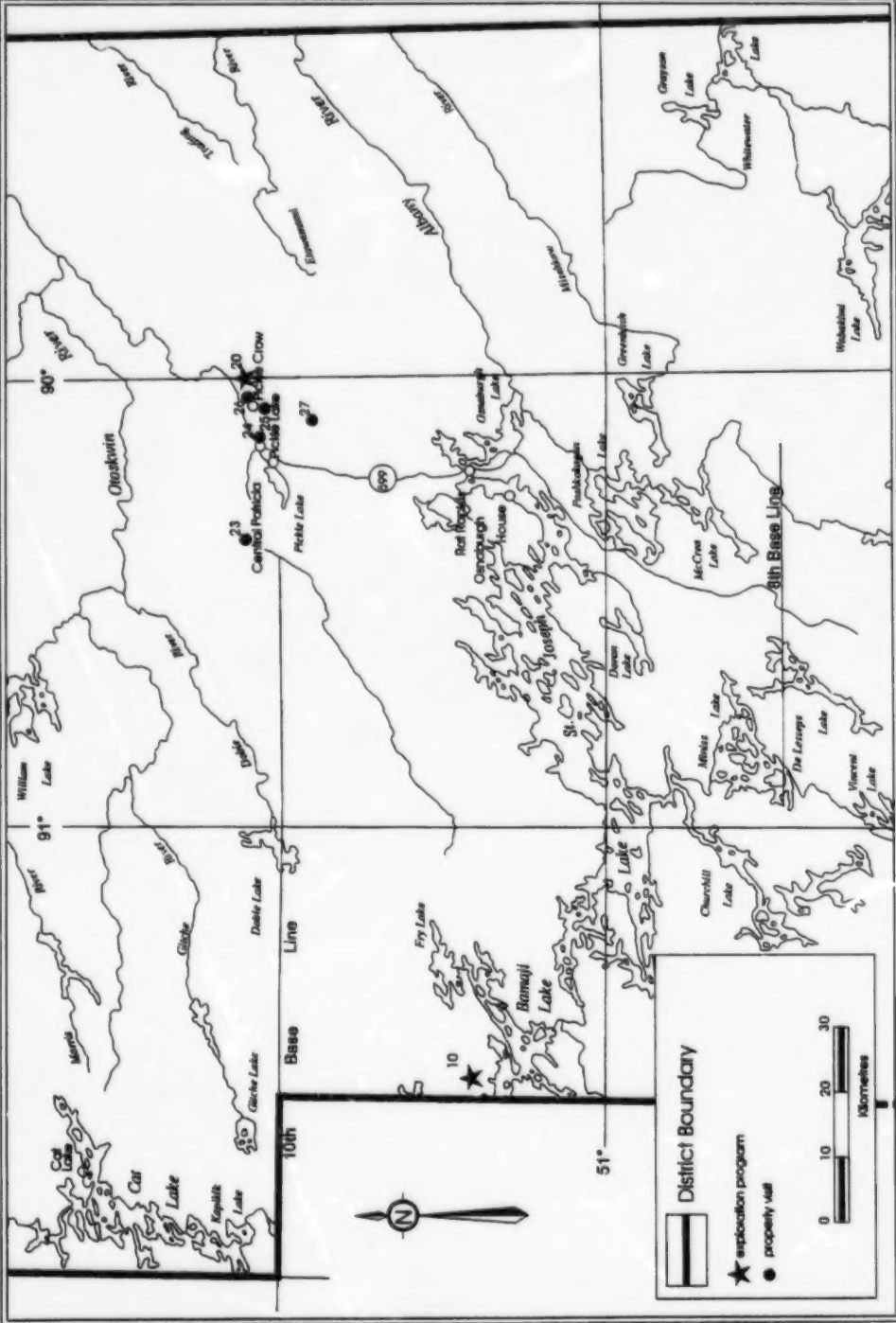
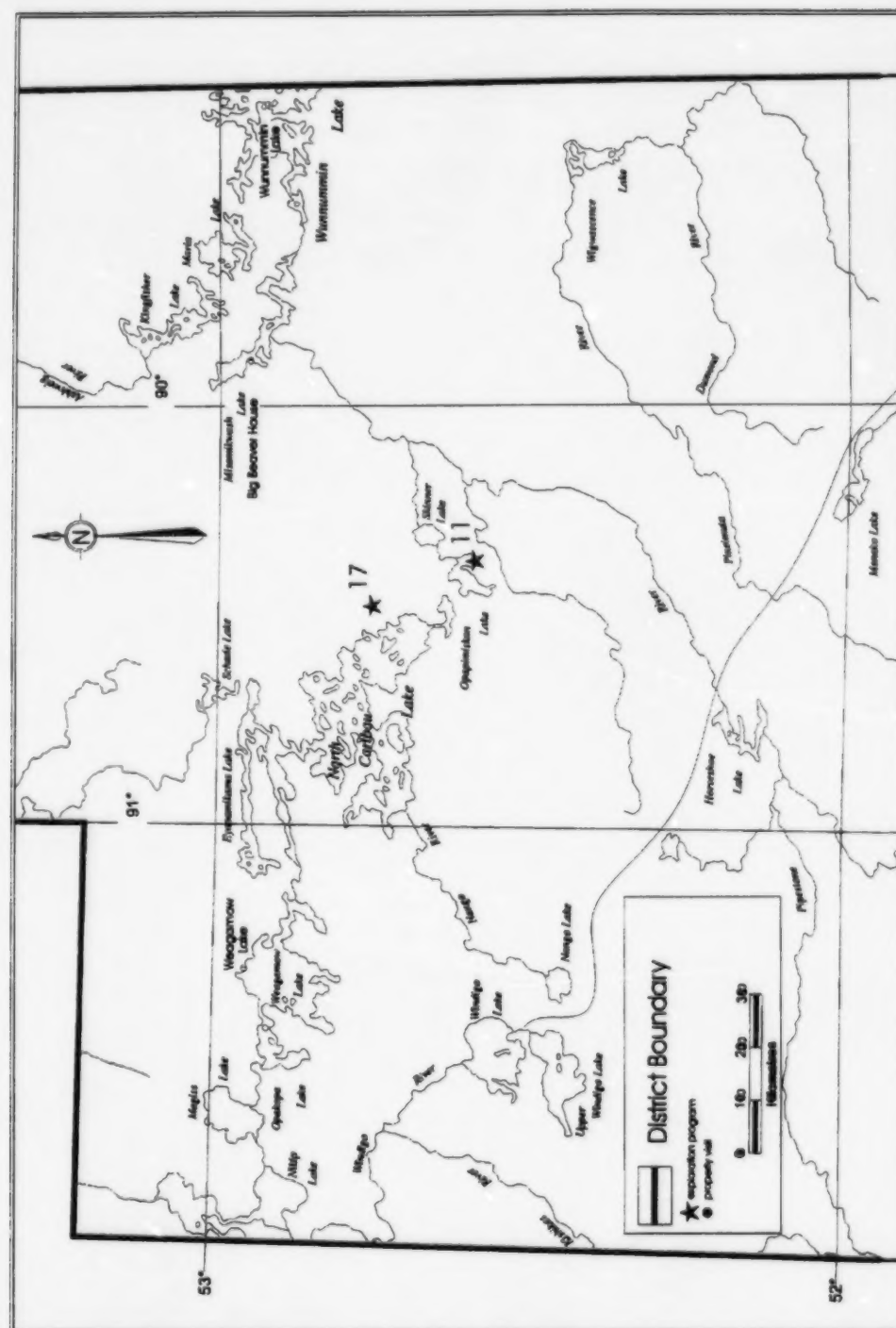


Figure 3. Exploration activity and property visits in the central part of the Sioux Lookout District.



**Figure 4. Exploration activity and property visits in the northern part of the Sioux Lookout District.**

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In 1999, the mine produced 209 176 ounces of gold. This was extracted from 1 218 931 tonnes of ore at an average grade of 5.61g/t gold. Recovery was 95.2%.

**Mine-site exploration continued through the year and added to the reserves and resources.**

At the end of 1999, proven and probable ore reserves were 13 824 000 tonnes grading 5.79 g/t gold.  
(A. Cheatle, Chief Geologist, Musselwhite Mine, Placer Dome North America Ltd., written communication, January 2000).

Table 1. Mine production and reserves in the Sioux Lookout District.

Mine	Production to end of 1999		Production in 1999		Reserves at end of 1999	
	Tonnage @ Weighted Ave. Grade	Total Commodity	Tonnage @ Grade	Total Commodity	Tonnage	Grade
Musselwhite Mine	3 374 096 t @ 5.53 g/t Au	568 850 oz.	1 218 931 @ 5.61 g/t Au	209 176 oz.	13 824 000	5.79 g/t Au

## EXPLORATION ACTIVITY

The level of exploration activity in the Sioux Lookout District during 1999 was substantially less than in 1998. Seven prospectors received OPAP grants that were applied to 5 different properties. The most significant decline in exploration activity during the year came from the junior exploration company sector, although some new properties were acquired and exploration work was completed on these. Table 2 lists all of the properties on which exploration work is known to have been completed in 1999.

**Table 2.** Exploration activity in the Sioux Lookout District in 1999.

Abbreviations	
AEM .....	Airborne electromagnetic survey
AM .....	Airborne magnetic survey
ARA .....	Airborne radiometric survey
Beep .....	Beep Mat survey
Bulk .....	Bulk sampling
DD .....	Diamond drilling
DDH .....	Diamond drill hole(s)
DGP .....	Down-hole geophysics
GC .....	Geochemical survey
GEM .....	Ground electromagnetic survey
GL .....	Geological Survey
GM .....	Ground magnetic survey
GRA .....	Ground radiometric survey
Grav .....	Gravity survey
HLEM .....	Horizontal loop electromagnetic survey
HM .....	Heavy mineral sampling
IM .....	Industrial mineral testing and marketing
IP .....	Induced polarization survey
Lc .....	Linecutting
Met .....	Metallurgical testing
OD .....	Overburden drilling
ODH .....	Overburden drill hole(s)
OMIP .....	Ontario Mineral Incentive Program
OPAP .....	Ontario Prospectors Assistance Program
PEM .....	Pulse electromagnetic survey
PGM .....	Platinum group metals
Pr .....	Prospecting
RES .....	Resistivity survey
Samp .....	Sampling (other than bulk)
Seismic .....	Seismic survey
SP .....	Self-potential survey
Str .....	Stripping
Tr .....	Trenching
UG .....	Underground exploration/development
VLEM .....	Vertical loop electromagnetic survey
VLFEM .....	Very low frequency electromagnetic survey



## **SIoux LOOKOUT DISTRICT—1999**

No	Company/Individual (Occurrence Name) or Property	Township/Area (Commodity)	Exploration Activity
1	Band Ore Resources Ltd. (Stillar Bay Option)	Jutten Tp, Poisson Tp. (Au)	Pr, Samp
2	Best, A. (Northern Lights)	Beckington Lake (Au)	Pr, Samp
3	Bond, J. and Johnson, S. (Minnitaki Lake)	Kabik Lake and Pickerel Tp. (Au)	Pr, Samp
4	Brown, D. and Darling, T. (Misfit Lake)	Kabik Lake and Pickerel Tp. (Au)	Pr, Samp
5	Cameco Gold Inc. (Black Lake)	Sharron Lake, Zarn Lake (Au)	13 DDH (2075 m), IP, GL, Samp
6	Decarle, B. Houghton-Hough Lakes)	Houghton Lake (BM, PGM)	Pros, GM, VLFEM, Grav, Samp
7	Glatz, A. and Woitowicz, M. (Gullwing)	Webb Tp. (Rare Metal Pegmatite)	2 DDH (103 m), Pr, Samp
8	Lee, N. (East Bay of Sturgeon Lake)	Squaw Lake (Au)	Shaft dewatering, Samp
9	Noranda Mining and Exploration Inc. (Sturgeon Lake Properties)	Valora Lake, Bell Lake (BM)	DGP, GM, IP
10	Parker, D. (Slate Falls)	Fry Lake, Wesleyan Lake (Au)	Pr, Samp, Str, Tr, GL, Petrographic Study
11	Placer Dome (CLA) Ltd. (Musselwhite Mine)	Skinner Lake, Zeemel Lake (Au)	DD 54 437 m
12	Prospector's Alliance Corp. (Staunton Lake)	Conant Tp. (BM)	GM, VLFEM
13	Riives, J. and Bernier, K. (Millenium Property)	Zarn Lake (Au)	Pr, Samp, Str, Tr
14	Riives, J. and Glatz, A. (Divine Guidance)	Drayton Tp. (Au)	Str, Tr, Samp, Pr, VLFEM
15	Roach, S. (Houghton Lake)	Houghton Lake (BM)	Pr, Samp
16	Roberecki, E. (Squaw Lake)	Squaw Lake (Au)	Lc
17	Romios Gold Resources Inc. (Lundmark - Akow)	Akow Lake, North Caribou Lake NE Pt. (Au)	5 DDH (944 m)
18	Stuarton Resources Ltd. (Centerfire Lake)	McIlraith Tp. (BM)	2 DDH (260 m), VLFEM, GM, GC, HLEM
19	Triex Resources Inc. (Minnitaki Property)	Kabik Lake and Pickerel Tp., Parnes Lake (Au)	Lc, GL, Pr, Samp 15 DDH (1558 m)
20	Wolfden Resources Inc, Jon Pol Explorations Inc. (Pickle Crow mine)	Dona Lake, Tarp Lake	Str, Samp, Bulk, 17 DDH (2200 m)

## **Band-Ore Resources Ltd.**

In October, Band-Ore Resources Ltd. optioned property in the Stillar Bay area of Savant Lake from prospectors S. and R. Stares of Thunder Bay. Additional ground was staked to form a 6-claim package covering 720 hectares in Jutten and Poisson townships. Prospecting and surface sampling before the onset of winter yielded assays up to 0.47 ounce per ton gold (16.11 g/t gold). The company has scheduled diamond drilling of approximately 600 m for the end of January 2000. (W. O'Connor, President, Band-Ore Resources Ltd., personal communication, January 2000).

## **Cameco Gold Inc.**

Cameco Gold Inc. continued exploration on their Black Lake property, located approximately 25 km northeast of Sioux Lookout. The property consists of 32 contiguous, unpatented mining claims in the Sharron Lake and Zarn Lake areas. Several northeasterly- and easterly-oriented deformation zones that represent splays of the adjacent

Miniss River fault and the Pond deformation zone crosscut the property. Following a comprehensive exploration program of geological mapping, trenching, sampling and diamond drilling in 1998, the company diamond-drilled 2075 m of core in 13 holes in February. Drilling was aimed at testing the Moretti deformation zone at shallow depths over a 1.5 km strike length. Selected assay results from the drill program are presented in Table 3.

**Table 3.** Selected results from Cameco Gold Inc.'s 1999 diamond-drilling program.

Hole No.	Interval (m)	Length (m)	Assay (g/t Au)
BKL9915	29.27 – 29.67	0.4	14.55
BKL9911	147.42 – 148.4	1.02	1.64
BKL9914	110.8 – 111.0	0.24	190.7
BKL9910	83.0 – 83.65	0.65	18.78
BKL9907	29.17 – 30.2	1.03	2.05
BKL9908	93.6 – 94.6	1.0	3.62

During July, geological mapping (1:2500) and geochemical sampling were completed, with the objective of examining remaining areas not surveyed by Cameco in previous years. Mapping delineated several areas of deformation and alteration favourable to gold mineralization, including the extension of the Botsford Lake deformation corridor and spatially associated mineralized quartz-feldspar porphyry. A time domain induced polarization (IP) geophysical survey was performed in October over the central part of the property, north and west of Black Lake. Nine linear anomalies were detected, 4 of which were designated worthy of further investigation, including three diamond drill targets. (Resident Geologist's files, Sioux Lookout District).

## Noranda Mining and Exploration Inc.

Work by Noranda Mining and Exploration Inc. on their south Sturgeon Lake properties in 1999 saw the completion of ground magnetometer and IP geophysical surveys begun in late 1998. The purpose of the program was to study a 9 km<sup>2</sup> area containing a deep seismic anomaly. One steeply dipping anomaly, open at depth and eastward from the grid, exhibited coincident low resistivity, high chargeability and high magnetic signatures. It has been recommended for drill testing. Other work included borehole geophysics and compilation. (Resident Geologist's files, Sioux Lookout District).

## Romios Gold Resources Inc.

Romios Gold Resources Inc. continued exploration on their Lundmark-Akow Lake property, northwest of the Musselwhite Mine. The property consists of 459 claims on which banded iron formation occurs, along a strike length of 23 kilometers.

**Table 4.** Assay results from Romios Gold Resources Inc.'s 1999 diamond-drilling program.

Hole No.	Total Width (m)	Avg. Assay (% Cu)	Avg. Assay (g/t Au)	Including Width (m/assay)
1	13.17	0.16		
	0.13		0.49	
2	18.8	0.28		0.4 / 1.65% Cu
	5.48		0.19	
3	12.21	0.39		0.21 / 2.5% Cu
	11.3		0.36	0.8 / 3.38 g/t Au
4	13.96	0.23		0.3 / 2.26% Cu
	1.14		2.88	0.84 / 3.93 g/t Au
5	28.37	0.14		
	0.4		0.93	

(Romios Gold Resources Inc. Press Release, March 31, 1999).



## SIOUX LOOKOUT DISTRICT—1999

The company completed a 5-hole diamond drilling program in February and March totalling 943.75 m. These tested the "Romios Shear Zone", discovered as a result of ground geophysical surveys and structural geologic mapping in 1998. Drilling was targeted on IP, electromagnetic and gravimetric anomalies associated with fold hinges in the deformed iron formation. Stringer-type copper mineralization within a garnet-sericite schist was intersected in all holes, over a strike length of more than 1 km. Assay results for gold and copper follow in Table 4.

The company plans to complete down-hole geophysics in 2000 to aid in delineating future diamond drill targets. (T. Drivas, President, Romios Gold Resources Inc., written communication, 1999).

## Triex Resources Inc.

Triex Resources Inc. purchased six patented mining claims (known as the Tak Patents) from Lac Properties Inc. in 1999. These patented claims are located inside their 300 claim Minnitaki Lake property. The additional claims cover several gold and copper showings and the western extension of the Wedge occurrence, characterized by sheared and altered mafic volcanic rocks and quartz-feldspar porphyry.

Line cutting, geologic mapping and extensive surface sampling were completed early in the field season, in preparation for a 1558-meter diamond-drilling program undertaken in July and August. Ten diamond-drill holes, distributed along the 14-km length of the property, tested a series of sheared and altered, quartz-feldspar porphyry intrusive (or sub-volcanic) bodies, intercalated mafic metavolcanic rocks and quartz-crystal tuffs. Two holes diamond-drilled on Burnthut Island, 5 km northeast of the Tak Patents, yielded intersections assaying 1.57 g/t Au over 3.79 m and 1.40 g/t Au over 1.50 meters. Three holes diamond-drilled on the west grid, 8 km southwest of the Tak Patents, produced intersections assaying 16.22 g/t Au over 0.45 m, 0.497 g/t Au over 4.54 m and 0.57 g/t Au over 3.00 m. (Canada Stockwatch, September 14, 1999).

Three additional holes were diamond-drilled as a fence to test the large, intensely altered quartz-feldspar porphyry situated on the Tak Patents. These yielded the intersections and assay results reported in Table 5:

**Table 5.** Intersections and assay results for Triex Resources Inc.'s diamond-drilling program on the Tak Patents.

Hole No.	From (m)	To (m)	Width (m)	Average Grade (g/t Au)
Tak-99-08	84.00	85.30	1.30	0.771
	136.00	136.50	0.50	4.800
Tak-99-09	17.00	19.40	2.40	0.994
	121.00	130.50	9.50	0.763
	142.30	147.30	5.00	0.577
Tak-99-10	3.57	35.40	31.83	2.062
Includes	25.50	28.38	2.88	11.778
	34.30	35.40	1.10	7.632

(Canada Stockwatch, September 14, 1999).

Encouraged by results from the Tak Patent drilling, the company anticipates further exploration in 2000. Detailed magnetic and IP geophysical surveys are planned in the coming year, followed by additional diamond drilling as warranted. (D. McIvor, President, Triex Resources Inc., personal communication, January 2000).

## Wolfden Resources Inc.

Wolfden Resources Inc. signed an agreement with Pickle Crow Resources Inc. to acquire 100% of the shares of Pickle Crow Gold Mines Limited, with assets of 98 patented gold mining claims leased from Teck Corporation. Between 1935 and 1966 this property near Pickle Lake produced 1 446 000 ounces of gold, at an average grade of

16 g/t, from workings to a depth of 1158 meters. The deposit remains open at depth with estimated reserves of approximately 1.1 million tonnes grading 7.54 g/tonne (Wolfden Press Release, September 15, 1999).

The 1999 exploration program included power stripping on the E-zone and trenching on the D-zone and bulk sampling of the No. 5 vein crown pillar. Diamond-drilling was performed on the No. 1 IF zone, the No. 13 vein and the extrapolated position of the No. 8 vein near surface.

Surface work exposed over 100 m of the E-zone, with grab samples returning assays up to 207.43 g/tonne. Power stripping resulted in the discovery of a previously unknown mineralized zone in iron formation, which the company plans to diamond-drill test in future. (Infomine News Release, November 12, 1999).

Bulk sampling of the No. 5 vein crown pillar saw the removal of 420 tonnes for evaluation. No assay figures were available at the time of writing (E. Downie, President, Wolfden Resources Inc., personal communication, 1999).

Diamond-drilling consisted of 17 holes, totalling 2200 m. Intersections and assay results are reported in Table 6.

Table 6. Intersections and assay results for 1999 diamond drilling on the Pickle Crow property.

Zones	Assay (g/t Au)	Intersection (meters)
No. 1 IF zone	2.26	13.7
	12.04	0.50
	2.50	6.00
No. 13 Vein	51.43*	5.90
	38.55	2.30
	10.11	1.15
	6.76	2.50
	7.35	1.30

(Northern Miner, December 13, 1999; \* E. Downie, President, Wolfden Resources Inc., personal communication, January, 2000).

## LAND USE PLANNING ACTIVITY

The "Ontario's Living Legacy" Land Use Strategy had only a minor impact on the Sioux Lookout District. The strategy recommended three sites for regulation as parks or conservation reserves in the district – the St. Raphael Waterway Provincial Park; the East English River Waterway Provincial Park; and the Lac Seul Islands Conservation Reserve. These sites did not affect areas with existing mineral rights tenure. The St. Raphael site, as recommended, will encompass only a small portion of the Lake St. Joseph – Pashkokgan Lake greenstone belt, where past exploration for massive sulphides did not encounter economic sulphide minerals. All other areas of the St. Raphael site have had little or no past exploration. The East English River site passes through a greenstone belt that connects the Sioux Lookout and Sturgeon Lake areas. There is past and ongoing exploration along this site. The Lac Seul Islands are underlain by English River Gneiss. There is little record of past mineral exploration involving these islands.

G. Seim completed a mineral resource assessment of the Kapkichi Lake area in response to a proposal put forward by the Township of Pickle Lake to acquire Crown Land for lakeshore cottage lots. Due, in large part, to the presence of large-tonnage, low-grade copper-nickel resources under the lake and along the lakeshore, the mineral resource assessment determined the mineral potential to be high to very high. This, in turn, led to a recommendation by the District Geologist against the sale of the Crown Land. Subsequent negotiations took place between the Ministry of Northern Development and Mines, the Ministry of Natural Resources and the Township of Pickle Lake. At the time of writing, these negotiations are still under way.

# SIoux LOOKOUT DISTRICT—1999

Table 7. Assessment files received in the Sioux Lookout District in 1999.

Abbreviations					
AEM .....	Airborne electromagnetic survey	Le .....	Linecutting		
AM .....	Airborne magnetic survey	Met.....	Metallurgical testing		
ARA .....	Airborne radiometric survey	OD .....	Overburden drilling		
Beep .....	Beep Mat survey	ODH.....	Overburden drill hole(s)		
Bulk.....	Bulk sampling	OMIP .....	Ontario Mineral Incentive Program		
DD.....	Diamond drilling	OPAP .....	Ontario Prospectors Assistance Program		
DDH.....	Diamond drill hole(s)	PEM .....	Pulse electromagnetic survey		
DGP .....	Down-hole geophysics	PGM .....	Platinum group metals		
GC .....	Geochemical survey	Pr .....	Prospecting		
GEM.....	Ground electromagnetic survey	RES .....	Resistivity survey		
GL .....	Geological Survey	Samp .....	Sampling (other than bulk)		
GM .....	Ground magnetic survey	Seismic .....	Seismic survey		
GRA .....	Ground radiometric survey	SP .....	Self-potential survey		
Grav .....	Gravity survey	Str.....	Stripping		
HLEM .....	Horizontal loop electromagnetic survey	Tr .....	Trenching		
HM .....	Heavy mineral sampling	UG .....	Underground exploration/development		
IM .....	Industrial mineral testing and marketing	VLEM .....	Vertical loop electromagnetic survey		
IP.....	Induced polarization survey	VLFEM .....	Very low frequency electromagnetic survey		

Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
Kabik Lake	Daniel P. Brown	97	Pr, Samp	2.19032	52F16NE0059
Achapi Lake	Northern Dynasty Minerals Ltd.	98	Re-assaying	2.18863	52P04NE0030
Armit Lake	N.W.T. Copper Mines Ltd.	98	Tr, Samp	2.18972	52J07NW0044
McAree Twp., Echo Twp., Webb Twp.	Corona Gold Corp.	96	GL,GC	2.1879	52F16SW0053
Wesleyan Lake, Fry Lake	Doug Parker	97/99	Lc, GM	2.19283	52O03NW0062
McAree Twp., Echo Twp., Webb Twp.	Corona Gold Corp.	98	DD (3158 m)	2.19294	52F16SW0054
Kabik Lake and Pickerel Twp., Parnes Lake	Triex Resources Ltd.	98	GL, Samp,	2.19094	52F16NE0060
Tarp Lake, Firstloon	Berland Resources Ltd. (Inmet JV)	97/98	DD (1264 m)	2.1935	52O09SE0102
Kabik Lake	Daniel P. Brown	97	GL, Samp	2.19169	52F16NE0061
Gullwing Lake	Mike Woitowicz	97	GL, Samp,	0	52F15NE0026
Barnaji Lake	Donald Brown	97	GL, Samp,	0	52O03NW0063
Duffell Lake	Gulfstream Trading Ltd.	98	VLFEM, HLEM	2.19445	52O02NW0055
Duffell Lake	Gulfstream Trading Ltd.	98	GL, Samp,	2.19446	52O02NW0056
Zeemel Lake	Placer Dome (CLA) Limited	98	DD (3025 m)	2.1928	53B09SW0061
Zeemel Lake	Placer Dome (CLA) Limited	98	DD-(U/G) (5100 m)	2.19281	53B09SW0062
Webb Twp	Alexander Glatz	98	Tr, Str	2.19352	52F15NE0027
Webb Twp	Alexander Glatz	98	Pr, Samp,	2.19352	52F15NE0027
Drayton Twp	Joe Riives	98	Pr, Samp,	2.19351	52J04SW0034
Drayton Twp	Alexander Glatz	98	Pros, Samp,	2.19444	52J04SW0033

Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
Jutten Twp	Richard Angove	98	VLFEM		
Sharron Lake, Zarn Lake	N.W.T. Copper Mines Ltd. [Cameco Gold Corp]	98	Pr, Str DD (996 m) , GL, Tr, Samp	2.19282 2.19515	52J08NW0052 52J04NE0036
Sixmile Lake, Bell Lake	Mines et Exploration NORANDA Inc.	98/99	GM,IP	2.19552	52G15NW0110
McAree Twp, Troutfly Lake	Corona Gold Corporation	98	DD (3825.9 m)	2.19381	52F16SW0055
Skinner Lake	Placer Dome (CLA) Ltd.	99	DD (12618 m)	2.19594	53B09NW0036
Zeemel Lake	Placer Dome (CLA) Ltd.	98	DD (4150 m)	2.19407	53B09SW0063
McAreeTwp., Keikewabik Lake, MacFie Twp.	Champion Bear Resources Ltd.	98	GL, Samp	2.19569	52F16SW0056
McAreeTwp., Keikewabik Lake, MacFie Twp.	Champion Bear Resources Ltd.	98	GM	2.19569	52F16SW0056
Kabik Lake and Pickerel Twp.	Triex Resources Ltd.	99	GL, Samp	2.19766	52F16NE0062
Kabik Lake and Pickerel Twp.	Triex Resources Ltd.	99	Pr, Samp	2.19752	52F16NE0063
Squaw Lake	Edward Roberecki	99	Lc	2.19748	52J02SE0130
Squaw Lake	Norman Lee	99	Pr, Tr, Samp	2.19613	52J02SE0131
Whipper Lake	Chester Kuryliw	98	GL,GM	2.19759	52K01SW0039

During the year, the District Geologist also provided input to the Official Plans of the Township of Pickle Lake and the Town of Sioux Lookout.

## RESIDENT GEOLOGIST PROGRAM STAFF AND ACTIVITIES

D. Farrow joined the office as District Support Geologist in February. G. Seim continued in the position of District Geologist until the middle of November, when he accepted a move to the District Geologist position in the Timmins Region. D. Farrow then took on the role of Acting District Geologist. S. Oakley and W. Green joined the office for 7 weeks each under the summer experience program.

Sioux Lookout District staff completed 33 visits to 29 properties/mineral occurrences/prospective areas within the District. Additional excursions were made to investigate other areas of geological interest.

Staff gave several presentations on the importance of the minerals industry and basic geology to youthful audiences. These included the Grade 9 class at Pelican Falls Secondary School, the Grade 5 class at Central Public School, the Grade 7 class at Sacred Heart Catholic School and the Ontario Rangers at the Cedarbough Lake camp.

Staff also attended the two regional industry Mines and Minerals Symposia held in April. The Northwestern Symposium was held in Thunder Bay, where a display and talk were presented by G. Seim, assisted by D. Farrow. The Northwestern RGP was represented at the Northeastern Symposium in Timmins by D. Farrow, along with M. Smyk of the Thunder Bay RGO. G. Seim also attended the Prospectors and Developers Association Convention in Toronto in March, assisting with the Northwestern Regional display.

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**Table 8.** Property visits conducted by the Sioux Lookout District Staff in 1999

Number (keyed to Figures 2,3 and 4)	Property/Occurrence
1	Misfit Lake Property
2	Jessie Lake Occurrence
3	Alcona Mine
4	Mine Lake
5	New Millenium Property (2)
6	St. Anthony Mine
7	Powell Occurrence
8	Davidson Carr Occurrence
9	Island Occurrence
10	Sabin Prospect
11	Hadley Occurrence
12	Goldlund Mine
13	Darkwater Mine
14	Yett Lake Dimension Stone
15	Crossecho Lake Stock (Building Stone Reconnaissance)
16	Lost Lake Granite (Building Stone Reconnaissance)
17	Southwest Lac Seul Area (Building Stone Reconnaissance)
18	Kabikwabik Lake Porphyritic Basalt
19	Pidgeon Molybdenum Deposit
20	Gullwing Lake Pegmatite Dike
21	Pike Lake Gabbro and Copper Occurrence
22	Handcuff Lake Gabbro
23	Thierry Mine Site
24	Central Patricia Mine Site, No. 1 Operation
25	Central Patricia Mine Site, No. 2 Operation
26	Pickle Crow Mine Site
27	Dona Lake Mine Site
28	Mimmitaki Lake Property, Triex Resources Ltd. (3)
29	McIlraith Tp Drill Program (2)

(#) = Multiple visits made to this site

In May, G. Seim attended the GAC/MAC conference in Sudbury and a post-conference field trip to study the geology and hydrothermal alteration assemblages associated with the volcanogenic massive sulphide deposits of the Noranda camp.

Staff responded to 278 personal consultations and 840 telephone inquiries during the year. In addition, as the program is co-located with the Northern Development Office, staff handled a significant number of inquiries related to that program.

## PROPERTY EXAMINATIONS

### Jessie Lake – DonDick Occurrence

Jessie Lake is located to the east of Highway 599, about 32 km north of the hamlet of Silver Dollar. There is a small, graveled parking area on the east side of the highway. A short (<50 m) portage leads to the lake. From there, it is a 20-minute paddle in a canoe to the showing, which is located on the shoreline of the east arm of the lake. The showing consists of a number of shallow trenches. Bedrock outcrops only in the trench nearest the shoreline.

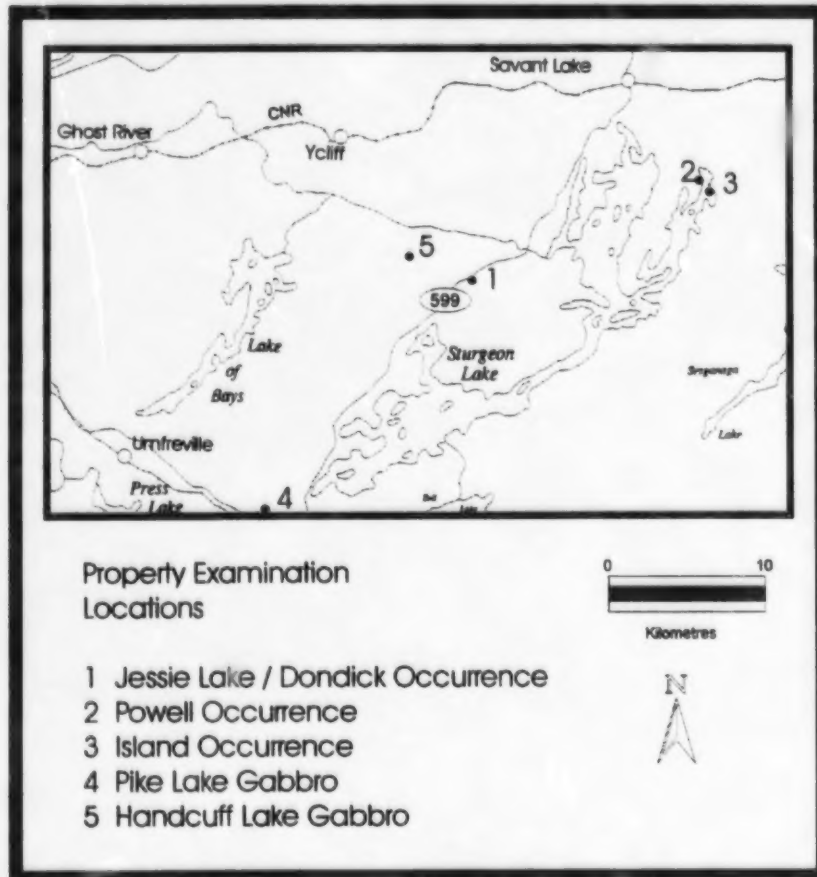


Figure 5. Location map for property examinations in the Sturgeon Lake area

D. and R. Hollingsworth discovered the Jessie Lake – DonDick gold occurrence in 1946 while working for Northern Canada Mines Ltd. Early reports were quite favourable (Wilson 1946):

The showing has been closely examined by Dr. Neal Beaton of Northern Canada Mines and he considers it worthy of diamond drilling. The mineralized showing is in a small outcrop on the shore of the lake and is completely surrounded by water and muskeg. It is a mineralized sericite-biotite shear zone having an east west strike. A quartz vein occurs in the shear which is exposed for 16 feet. Unweathered material was assayed. Samples taken across the 10 foot width of the outcrop gave gold values of 1/4 ounce of gold per ton.



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A. Best and W. Hollingsworth of Savant Lake completed blasting and sampling of this occurrence in 1987 (Sioux Lookout District Assessment File 52J/02SW-0080). S. Johnson, W. Read and the late S. Johnson of Sioux Lookout completed prospecting and sampling in 1989 (Sioux Lookout District Assessment File 52J/02SW-0083). The latter workers collected 6 samples from the pit, which assayed between 0.055 ounce gold per ton and 0.220 ounce gold per ton. They also reported finding additional, mineralized zones inland and to the east along the lakeshore.

The Sioux Lookout District Geologist and District Support Geologist examined this occurrence on June 10, 1999. The shoreline trench was quickly located and short traverses made inland in an attempt to locate additional mineralization described by the Johnsons and Read. Trenches were located a short distance inland, but these did not expose bedrock. The bush inland is very thick, resulting in limited visibility.

The shoreline showing consists of a weak, locally iron carbonate-altered, shear zone through mafic metavolcanic rock. The shear is oriented 080/75S. The shear zone is locally mineralized with quartz veinlets and disseminated pyrite and chalcopryite. At the western end of the exposure, the shear zone appears to be over a meter in width, but at the eastern end, it narrows to less than 15 cm.

This description varies from that of N. Beaton, in that a quartz vein was not observed. The blasting done in 1987 and revegetation of the shoreline may explain this.

Samples taken during the examination of this showing are described in Table 9

Table 9. Assay results for grab samples from the Jessie Lake -- DonDick occurrence.

Sample Id.	Sample Type	Description	Results (ppb Au)
GWS-99-7	Grab	Sample from mafic volcanic NW of the occurrence f.g. mafic volc., weak cleavage, weak carb, weak qtz flooding, Tr. Py	ND
GWS-99-8	Grab	Sample from hanging wall to shear zone. Massive, f.g., mafic volc.	23
GWS-99-9	Grab	Sample from hanging wall side of shear zone f.g. mafic volcanic, sheared, weakly carbonatized	5
GWS-99-10	Grab	Sample from within shear zone f.g mafic volc., sheared, carbonatized, silicified, no sulfides	6
GWS-99-11	Grab	Sample from within shear zone f.g. mafic volc., strong carbonate alteration, Tr. - 1% f.g. Py	1934
GWS-99-12	Grab	Sample from muck pile Fe Carb altered mafic volc cut by qtz stringers and veinlets, Tr.- 1 % dissem. Py,	1573
GWS-99-13	Grab	Tr. Cpy Sample from muck pile - Fe Carb altered mafic volc cut by qtz stringers and veinlets, Tr.- 1 % dissem. Py, Tr. Cp	1017

## Powell Occurrence

The Powell occurrence is located on the west side of Northeast Arm of Sturgeon Lake, approximately 1.2 km south of the north tip of the Arm. This occurrence is about 1 km west-northwest of the Davidson-Carr Mine. The occurrence can be reached by boat or aircraft in summer from access points on the east side of Sturgeon Lake. In winter, local trails from the Beckington Lake road may allow access to Northeast Arm of Sturgeon Lake.

The Powell occurrence was discovered prior to 1911 when E.S. Moore (1911) of the Ontario Department of Mines visited it. He wrote:

On the west shore of Northeast bay, on Claim A.L. 701, there is a deposit locally known as the Powell property. Last summer it was developed for Mr. Beidelman under the management of Mr. Atwood, who was formerly with the Douglas Mining Company. The workings lie on a vein, consisting of attractive looking quartz, beginning near the lakeshore and



running a little west of south. There are a number of pits, and two of them were about 25 feet deep, but neither was timbered at the time of our visit.

In 1981, Sherritt Gordon Mines Limited carried out geological mapping, sampling, ground electromagnetic and magnetic surveys over a block of claims that included the Davidson-Carr and Powell occurrences. In 1982, the company continued with additional geological and geophysical surveys over the Powell occurrence. This work included analyses of selected grab samples from a quartz vein approximately 1 foot wide, which returned assays of 0.18 to 0.64 ounce gold per ton. The vein contained pyrite, pyrrhotite and chalcopyrite, as well as rare visible gold.

In 1988, Villeneuve Resources Ltd. conducted drilling programs on the Davidson-Carr and Powell properties. Diamond-drill hole P-88-2 on the Powell property intersected a 4-foot mineralized section, which assayed 0.87 ounce gold per ton.

E.S. Moore (1911) described the geology of the Powell occurrence:

The rocks consisted of a complicated mixture of quartz-porphyry, grey schist and greenstone, and the vein lies sometimes in one rock and sometimes in the other and in places along the contact with the two. It varies in width from 2 to 15 inches, and frequently breaks up into stringers, especially at the contact between different types of rock. The quartz is well mineralized with pyrite and chalcopyrite, the latter frequently altered to malachite and azurite. We had no difficulty in finding good samples of gold at a depth of 20 feet. The gold specimens are doubtless due to the secondary enrichment, as they occur in association with the secondary carbonates of copper.

Near the pits described there are a number of smaller ones on this same vein, which fingers out a little farther south.

V.R. Venn (1982), Chief Geologist with Sherritt Gordon Mines Ltd. in Dryden, described his findings at the Powell occurrence:

The veins appear to lie along the contact of a band of basic volcanics on the southeast and felsic volcanics (quartz porphyry) on the north-west. The volcanics strike north-easterly. The basic volcanics to the northwest of the shaft are highly sheared and form a northwesterly facing fault scarp which on the geology and magnetometer maps trend to the southwest, where it intersects the area of the Richelieu Mine.

There appears to be two sets of veins on the property, striking N45°E and N30°W. The vein in the No. 1 shaft (main shaft) at the top of the hill is not readily observable because of the rock debris piled around the shaft. The vein, as observed in the shaft, appears to be about 16" wide, dips vertically and strikes toward No. 2 shaft, located about 100 feet north-easterly on the side of the hill.

The vein in the No. 2 shaft is about 5" wide at surface and occupies a shear zone about 3 1/2 feet wide. Further down the shaft the vein was observed to widen out to about 12". The quartz vein at surface assayed 0.022 oz Au (Sample No. B1-253). The shear zone assayed a trace gold (Sample No. B1-254, B1-255). A gossan sample from the vein area assayed 0.002 oz gold (Sample No. B1-261)."

A second set of narrow quartz veins occupy the north wall of the pit (#2 shaft). They strike north-easterly and dip 30° south-easterly. The two sets of veins appear to be coeval. This set of veins was not sampled.

On the lakeshore in the area of C.S. 516N two vertical, parallel quartz veins about 15' apart strike south-easterly for a distance of about 25' and terminate in the chlorite schist. The more northerly vein is about 25" wide at the lakeshore, and assayed a trace gold (Sample No. B1-242). The more southerly vein is about 15" wide and also assayed a trace gold (Sample No. B1-244).

On cross section 511 a rhombic vein pattern was observed in quartz porphyry. The veins are about 4"-6" wide and dip 30° to the southeast. Samples from these veins indicated a trace gold (Samples B1-249; B1-250). The vein pattern at this point appears comparable with that observed in number 2 shaft.

On cross section 512, 192E a cribbed pit in metabasalt contains a quartz vein about 12-14" wide. The vein contains pyrite, pyrrhotite and chalcopyrite. Sample B1-251 of the sulphide assayed 0.642 oz Au. Sample B1-252 - vein quartz only, assayed 0.186 oz Au. A quartz vein about 75 feet south of the number 1 shaft occurs next to an old pit. The vein is 14-16" wide. Sample No. 246 gave 0.386 oz Au, while samples of the wallrock assayed 0.01 and 0.099 (Samples B1-247 and B1-248).

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G. Seim and J. Mason (Regional Resident Geologist, Thunder Bay North) briefly visited the Powell occurrence on June 29, 1999. Two shafts were located on a hilltop 30 m above the lake. Both were surrounded by barbed wire. Though there is ample evidence of past work in the area, only the area between the shafts was examined. A 15 to 30 cm wide quartz vein strikes at 210° from the more northerly of the two shafts; it dips at 45°N. The vein is hosted in a narrow, shear zone that strikes parallel to the foliation of the country rock. Both the vein and the shear zone are hosted by fine-grained, sheared metavolcanic rock, however, the prominent shear direction in the mafic metavolcanic rock is 250/85N. The shear zone that hosts the quartz vein exhibits weak iron carbonate alteration, primarily as thin veinlets. The shear zone contains trace amounts of pyrite. The quartz vein is quite variable in its width. It is a quartz-tourmaline-iron carbonate vein that is mineralized with trace amounts fine pyrite, chalcopyrite and visible gold. Locally the vein has a crack-seal texture.

Four grab samples were taken from the vein and surrounding wall rock. The results are in the Table 10.

**Table 10.** Assay results for grab samples from the Powell Occurrence.

Sample Number	Description	Results (ppb Au)
GWS-99-14	White qtz - Fe carb vein with Tr - 1% Py, Cpy as fine blebs and crystals. Vein contains many ribbons of mafic volc. wall rock	7240
GWS-99-15	Wall rock to vein	42
GWS-99-16	Well-sheared mafic volc. with strong iron carbonate, no sulfides	14
GWS-99-17	Sheared mafic volc. cut by 2 cm iron carbonate vein. no sulfides	5855
	Crack-seal quartz tourmaline vein. Tr. - 1% very fine diss. Py on tourmaline crack surfaces.	

No quartz veins or mineralization were observed around the more southerly of the 2 shafts. The vein that extends south from the more northerly shaft does not appear to be the target at the more southerly shaft. Furthermore, many of the old workings described by V.R. Venn (1982) appear to be on yet another, parallel, north-northeasterly trending structure at the contact between mafic metavolcanic rocks and felsic quartz porphyry which is possibly, itself, a metavolcanic rock.

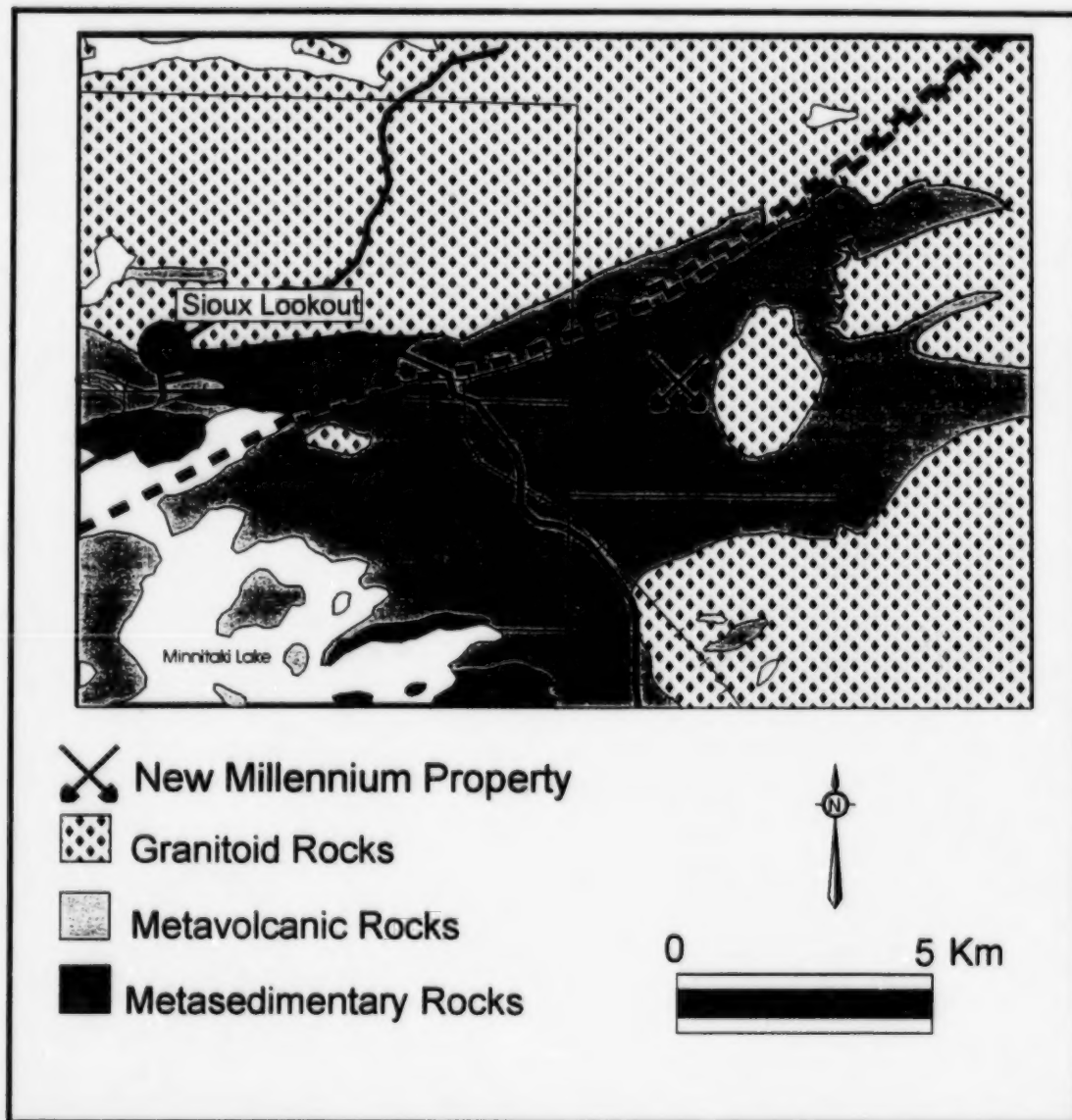
Although work to date indicates that the veins at the Powell occurrence are narrow, results of sampling suggest that they can contain significant gold mineralization. The Villeneuve intersection suggests that the quartz veins may locally widen, while retaining grade. Future work should include detailed mapping and prospecting.

## Island Occurrence

Sturgeon Lake area prospectors have, in the past, remarked that quartz veining on the island to the south of the Davidson Carr occurrence is an extension of the same quartz vein and shear system. Significant gold assays have been obtained by past workers from both the north and south ends of the island. Examination of the north end of the island located a trench blasted inland from the shoreline. A 15 cm wide, quartz-iron carbonate vein is hosted within a narrow shear zone oriented at 020/50, in an iron-carbonate altered leucogabbro. The quartz vein is mineralized with traces of pyrite and chalcopyrite. A sample of this material returned an assay of 6855 ppb Au.

## New Millennium Property

Early in 1999, J. Riives of Dryden and K. Bernier of Sioux Lookout reported finding a series of old, grown-in trenches northeast of Michaud Lake. Access to the property is either by boat from Al's North Star Lodge on Kirk Lake or by tractor trail from the Alcona Mine forest access road. Sampling of quartz veins and sulphide mineralization in the wall rock yielded several significantly anomalous assays. In late September, the prospectors completed mechanical stripping and hydraulic washing of the trenches and the outcrop between them, followed by sampling and mapping.



**Figure 6.** Location map for the New Millennium property.

On October 15, G. Seim accompanied J. Riives to the property to examine the work and the showings. Two stripped areas were examined. The first starts 50 to 75 m east from the north shore of Michaud Lake and is on a quartz vein and shear system that is oriented 250/80N. The second area, known as the Porphyry Trench, is on a north-trending shear zone that cuts a quartz porphyry dike. Time constraints did not permit the viewing of a third stripped area to the northeast.

The first excavated area contains one prominent shear zone. It is 1 to 1.5 m wide and exhibits very little iron carbonate alteration. A series of quartz vein boudins occur along the shear zone. These vary greatly in length and

## SIOUX LOOKOUT DISTRICT—1999

are up to 30 cm in width. The quartz boudins exhibit a crack seal texture, consist of white to smoky quartz and contain disseminated grains and seams of fine-grained pyrite, chalcopyrite and galena. The quartz boudins may also contain rare sphalerite and visible gold. Locally, the sheared wallrock contains 1 to 5 % disseminated pyrite. The rocks hosting the shear zone are weakly feldspar porphyritic, mafic metavolcanic flows. Some interflow metasedimentary rocks are also exposed in the excavation. There are at least 2 parallel shear zones exposed by the excavation, but these were not thoroughly examined.

Table 11 shows assay results of 4 grab samples taken from this first stripped area. Trench T5 is located at the western end of the excavation, where a narrow quartz vein is continuous over 6-to 8 m. Trench T10 is located at the eastern end of the excavation. Sample GWS-99-39 was collected from sulphidized basalt about midway between T5 and T10, a distance of about 150 m. The anomalous platinum and palladium assay results may indicate the sample was an ultramafic rock and that further prospecting for this rock type is warranted.

Table 11. Assay results for samples taken from the New Millenium property, first excavated area.

Sample Id.	Sample Type	Description	Au (ppb)	Pt (ppb)	Pd (ppb)
GWS-99-39	Grab	Sheared f.g. basalt with 3-5% diss. and stringers euhedral Py	26	100	125
GWS-99-40	Grab	Trench T5 Sugary, white quartz vein, with thin laminae of darker quartz/mica/sulphide, up to 2% fine diss. Euhedral Py associated with the laminae. (recrystallized chert?)	1318	ND	ND
GWS-99-41	Grab	Trench T5 Sugary, white quartz vein, with thin laminae of darker quartz/mica/sulphide, up to 5% fine diss euhedral py associated with the laminae. (recrystallized chert?)	5668	ND	ND
GWS-99-42	Grab	Trench T10 Sugary, white to grey quartz vein with 1-2 % diss./stringer sulphides (py,cp,sp,gn). Sample comes from small boundinaged quartz vein.	1.31 opt Au	NA	NA

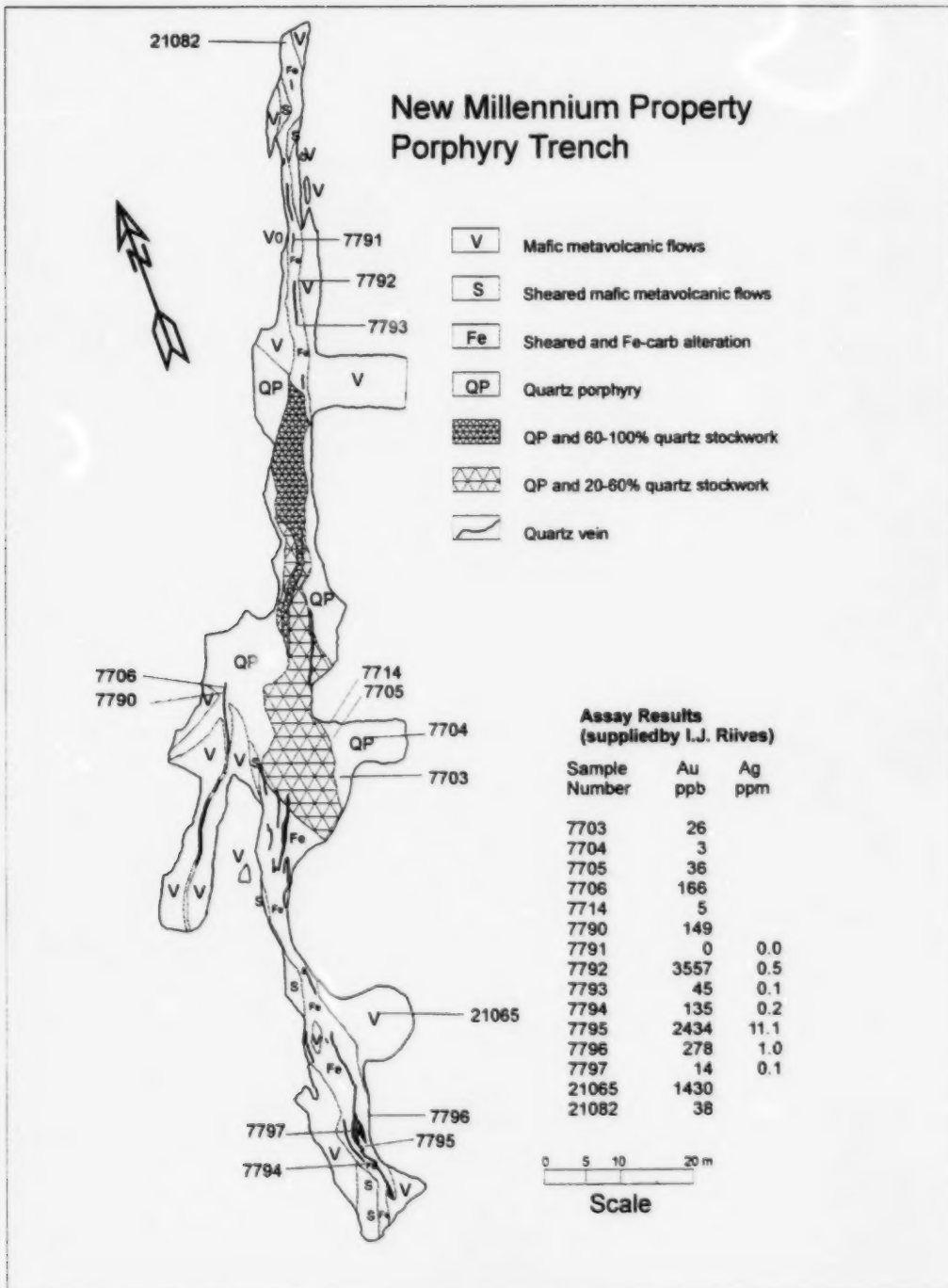
ND = Not detected. NA = Not Assayed

The Porphyry Trench starts about 60 m to the south of the first excavated area, near the east end of the excavation. This trench follows a 005 to 027° trending shear zone south for about 150 m. Figure 7 displays the geology of this trench. At the north end of the trench, the shear zone cuts through pillowed mafic metavolcanic flows. Here, the shear zone averages 2.5 m in width and the sheared rock is iron carbonate-chlorite schist. Boudins of a narrow quartz vein (<30 cm) occur in the middle of the shear zone. Interestingly, there is a section of the shear zone near the north end of the trench where the iron carbonate-chlorite schist is bounded by chlorite schist. The strike of the iron carbonate-chlorite schist is about 060° through this area. Chlorite schist is also found near the south end of the trench, where the strike of the iron-carbonate rich rock changes to 005°.

A 35 m wide quartz porphyry dike strikes 350°, through the central portion of the trenched area. Quartz filled stockwork veining occurs where the shear zone crosses the porphyry. The blocks of porphyry within the stockwork are not sheared, indicating that the porphyry brecciated in response to the deformation that caused the shearing in the mafic metavolcanic rocks. The stockwork reaches widths greater than 15 meters. Toward the more northerly contact of the porphyry, the stockwork contains 60 to 100% quartz matrix. The quartz is "bull" white and has little or no sulphide content. Southward, the amount of quartz matrix in the stockwork decreases to about 20%. Individual veins can be traced from the stockwork southward into the sheared and iron-carbonate altered mafic metavolcanic rock.

South of the quartz porphyry, the sheared and iron carbonate-altered mafic metavolcanic rock exhibits less shear fabric than to the north, but the zone is wider. This may be a reflection of increased iron-carbonate replacement of the rock. In addition, quartz veining south of the porphyry is more persistent than to the north and locally blowout features can reach 1 to 2 m in width.

The gold and silver assays in Figure 7 demonstrate that the shear system and quartz veining exposed in the porphyry trench are mineralized with these metals. Furthermore, all of the samples were grab samples. The Porphyry Trench warrants more extensive and systematic sampling, especially the quartz-filled stockwork within the porphyry.



**Figure 7.** Geology, sample locations and assays for the Porphyry Trench, New Millenium Property.



## Pike Lake Copper Occurrence and Gabbro

The Pike Lake gabbro lies immediately to the northwest of the intersection of highways 599 and 642. It is an irregularly shaped, intrusive body located west of the Beidelman Bay Intrusion, the supposed synvolcanic feeder to the south Sturgeon Lake volcanic complex. The Pike Lake gabbro is about 9 km long and up to 3 km across. The area of the Pike Lake gabbro is crossed by many logging roads constructed in the early 1980's and many of these remain passable. Dense regeneration in clear-cut areas makes traversing difficult and smaller outcrops are harder to find.

The Pike Lake gabbro has a number of copper  $\pm$  nickel sulphide showings. These have been explored since the discovery of the volcanogenic massive sulphide (VMS) deposits south of Sturgeon Lake, but no economic mineralization has been found. In 1989, the late S. Johnson, his son Sherridon and B. Read prospected parts of the intrusion and assayed several samples for platinum group metals as well as copper, nickel and gold.

On July 29, G. Seim and W. Green completed reconnaissance of the Pike Lake gabbro by means of a logging road running north from Highway 642, west of Pike Lake, turning west and then south and eventually returning to Highway 642. Several outcrops along and near the road were examined for sulphide mineralization and textural variations in the gabbro. Only 3 outcrops were sampled. One of these is a copper occurrence located at UTM coordinates (15) 627980E 5519471N. Here, a narrow shear zone oriented 110/70S cuts through a medium- to coarse-grained gabbro. The gabbro exhibits minor textural variations, but no sulphide mineralization. The shear zone, which is 15 to 30 cm in width, contains fine-grained, mafic rock that may have once been a raft of basalt. Where the fine-grained mafic rock is the widest, it is also mineralized with stringers and massive chalcopyrite and pyrrhotite. A chip sample from this area returned 29% Cu and 283 ppm Ni, but the areal extent of the mineralization is small. Table 12 below lists this sample, along with 2 other samples from around the shear zone and 2 outcrops far removed from the showing.

Table 12. Assay results for sampling of the Pike Lake Gabbro.

Sample Id.	Sample Type	Description	Cu (ppm)	Ni (ppm)	Pt (ppb)	Pd (ppb)
GWS-99-19	Grab	UTM 15 627891E 5518935N Hb-Plag Gabbro, med.-grained, lineated, melanocratic, Highly magnetic, diss Po?	285	54	ND	ND
GWS-99-20	Grab	Copper Occurrence UTM 15 627980E 5518935N Chip of sheared gabbro or mafic volc containing Cp stringers (15%)	290681	283	ND	ND
GWS-99-21	Grab	Copper Occurrence UTM 15 627980E 5518935N Mesocratic, med. grained, massive gabbro, non magnetic, no sulfides, to N of GWS-99-20 by 10 m	84	148	ND	ND
GWS-99-22	Grab	Copper Occurrence UTM 15 627980E 5518935N Mesocratic, med. grained, massive gabbro, non magnetic, no sulfides, to N of GWS-99-20 by 3-4 m	434	134	ND	ND
GWS-99-23	Grab	Pike Lake Gabbro UTM 15 626604E 5519189N c.g. massive leucocratic gabbro,	92	92	ND	ND

ND = not detected

The Pike Lake gabbro, where sampled, did not contain detectable quantities of platinum or palladium, nor were significant textural variations observed in any of the outcrops examined. Given these factors, the Pike Lake gabbro would not seem to be a high priority target for prospecting for platinum group elements (PGE).

## Handcuff Lake Gabbro

On August 5, G. Seim and W. Green completed a reconnaissance traverse across part of the Handcuff Lake gabbro in an attempt to determine if the body has potential to host copper-nickel-PGE mineralization.

The Handcuff Lake gabbro is located to the west of the Sturgeon Lake greenstone belt, north the Lake of Bays Batholith and south of the Lewis Lake Batholith. For the most part, the gabbro body is bounded by granitic gneiss on the west, south and east, but the gabbro apparently intruded the Lewis Lake Batholith to the north.

The logging road along which the traverse was completed leads off Highway 599 and is the access road to the Ten Mile Lake Camp. It then leads north, but unfortunately does not provide access to the southern lobe of the intrusion. The road does cut across the central lobe of the intrusion north of Gibraltar Lake. It then turns west along the northern contact of the central lobe.

Eleven grab samples were taken across and along the central lobe of the intrusion. These were analyzed for copper, nickel and PGE. The results are given in the Table 13.

Table 13. Assay result for samples of the Handcuff Lake Gabbro

Sample Id.	Description	Cu ppm	Ni ppm	Pt Ppb	Pd ppb
GWS-99-24	UTM 15 637238E 5547006N f.g.- m. g., massive, melanocratic gabbro. Tr. Cp	73	192	ND	ND
GWS-99-25	UTM 15 637395E 5547465N Med. grained, massive, mesocratic gabbro. Tr. Sulfide (Cp?) magnetic	128	79	ND	ND
GWS-99-26	UTM 15 637395E 5547465N f.g.- med. grained., Massive, melanocratic gabbro. Saussuritized feldspars, magnetic	119	47	ND	ND
GWS-99-27	UTM 15 637360E 5547992N Leucocratic med. to c. g. gabbro, non magnetic, no sulfides	25	60	ND	ND
GWS-99-28	UTM 15 637354E 5547904N Mesocratic med. Grained gabbro, non magnetic, no sulfides	52	71	ND	ND
GWS-99-29	UTM 15 637369E 5548193N Melanocratic, f. to med. Grained gabbro, weakly magnetic, Tr. - 1% Po	165	109	ND	ND
GWS-99-30	UTM 15 637380E 5548004N Foliated mesocratic, fine to med. grained gabbro, non magnetic, no sulfides	46	126	ND	ND
GWS-99-31	UTM 15 637223E 5549164N Melanocratic fine to med. Grained gabbro, magnetic, Tr. Po	98	95	ND	ND
GWS-99-32	UTM 15 636498E 5549421N Melanocratic fine to med. Grained gabbro, magnetic, Tr. Po	78	45	ND	ND
GWS-99-33	UTM 15 636212E 5549481N Melanocratic med. to coarse grained gabbro, non magnetic,	74	57	16	18
GWS-99-34	UTM 15 637223E 5549164N Mesocratic med. grained gabbro, magnetic	40	32	ND	ND

ND = Not Detected

The outcrops examined during the traverse showed relatively minor textural variations at the outcrop scale. Many contained xenoliths of very fine- to fine-grained amphibolite, presumed to be of volcanic origin. Also, fine-grained mafic dikes cut many of the exposures and at times, it was difficult to determine dike from xenolith. Infrequent quartz-feldspar porphyry dikes cut the gabbro. Although the contacts of the gabbro with the country rocks were not observed, the texture of the gabbro and the xenoliths point to the body being intrusive. Furthermore, it would appear that there was some differentiation of the gabbro and that it may be crudely layered. The sample descriptions given above illustrate that the gabbro varies in crystal size, color index and magnetism. All of the samples contained only background quantities of copper and nickel. Sample GWS-99-33 did return low platinum and palladium values.

The traverse across the central lobe of the Handcuff Lake gabbro did not reveal any sulphide mineralization worthy of follow up. However, it did point to crude layering of the intrusion based on composition, texture and magnetism.



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Only a small portion of the intrusion was examined and there is sufficient variation in the outcrops to suggest that there may be mineralization elsewhere in the intrusive. Further prospecting of the Handcuff Lake gabbro for PGE and copper-nickel mineralization is warranted.

## RECOMMENDATIONS FOR EXPLORATION

### Platinum Group Elements

In the Sioux Lookout District, there are two areas where PGEs are known to occur in potentially recoverable quantities. The first consists of reef-like layers within the Big Trout Lake Intrusion. Platinex Inc. is attempting to organize further exploration on these layers. The second is in association with the copper-nickel deposits in the Kapkichi Lake area (i.e., the past producing Thierry Mine). Here, the PGE concentrations are subject to some discussion. In 1990, Etruscan Enterprises Ltd. stated that the Thierry Deposit had reserves in all categories of 7,000,000 tonnes with an average grade of approximately 1.88% Cu and 0.23% Ni, to a depth of 2500 feet. They also reported that the mineralization included significant concentrations of platinum group metals (Vancouver STOCKWATCH, July 12, 1990). Sage and Breaks (1982) reported PGE assays for 3 samples. The values reported are 0.30, 0.26 and 0.22 ounce per ton palladium and 0.07, 0.04 and 0.03 ounce per ton platinum. Patterson (1980) reported PGE assay values from grab samples from within the mine workings that range from 0.005 ounce per ton platinum and 0.009 ounce per ton palladium to 0.298 ounce per ton platinum and 0.327 ounce per ton palladium. He also indicated that mill head grade over close to a 1 year period was 0.005 ounce per ton platinum and 0.015 ounce per ton palladium. During most of the mine's life, only a copper concentrate was produced. A nickel circuit was added shortly before the mine ceased operating. It is possible that PGEs were difficult to recover with the copper concentrate. In the late 1980's, Umex Inc. completed underground and surface exploration that, among other details, looked at the PGE content of the Thierry deposit. The results were not made public. In 1999, the authors collected 4 grab samples of mineralized fly rock from around the mine site. Table 14 gives the assay results for these samples.

Table 14. Assay results for 4 samples of fly-rock collected from the Thierry mine site in 1999.

Sample Number	Description	Au (ppb)	Pt (ppb)	Pd (ppb)	Cu (ppm)	Ni (ppm)
GWS-99-35	10 – 15 % Po, 5 – 7 % Cp breccia ore ?	90	311	821	23849	4810
GWS-99-36	10 – 15 % Po, 3 – 5 % Cp stringer or breccia ore	197	236	740	28455	3522
GWS-99-37	10 % Po, 2 – 5 % Cp stringers	51	228	722	13634	3897
GWS-99-38	Sample taken from off tailings dam Barren amphibolite with a 0.5 to 1.0 cm seam of massive chalcopyrite on one side.	19	41	160	11475	665

The PGE content of the Thierry deposit requires further investigation given the variance of historically reported PGE values.

Sage and Breaks (1982) recommended that future exploration programs should carefully examine all peripheral zones of the supracrustal belts for the presence of mafic-ultramafic lenses and superimposed, prominent shear systems. The purpose of such work would be to locate bodies of copper-nickel-PGE mineralization similar to the past-producing Thierry Mine at Kapkichi Lake. Three geographically separate, low-grade copper-nickel deposits in this vicinity have an aggregate resource of 99.5 million tons averaging 0.35% Cu and 0.1% Ni (Sioux Lookout District Office Files, Sioux Lookout). PGE data are not available for these deposits. Given the favorable platinum and palladium prices and improving copper and nickel prices of late, the favorable geology, and the availability of land, further examination of the north margin of the Pickle Lake greenstone belt is warranted.

One of the key criteria for the concentration of copper-nickel-PGE mineralization in mafic-ultramafic rocks requires the magma to have reacted with and/or digested sulphur-rich country rocks, usually of sedimentary origin. Another important factor is that several of the world's major deposits occur near major crustal sutures (Naldrett, 1997). Both

of these key factors are useful as guides to exploration, in that they can be used to select a target area in advance of discovery. The Atikokan area, where significant PGE exploration occurred in 1999, satisfies these conditions in the form of the Quetico metasedimentary rocks and the Quetico Fault respectively. Two areas in the Sioux Lookout District that may meet these criteria are discussed below.

Sanborn-Barrie et al. (1999) propose an Archean crustal suture between older and younger Archean rocks from the eastern margin of the Sturgeon Lake greenstone belt north into Savant Lake greenstone belts. In the eastern portion of the Sturgeon Lake greenstone belt, near Vista Lake and Quest Lake, Trowell (1976, 1983) mapped a number of small gabbro plugs within the Quest Lake – Princess Lake metasediments. Some have sulphide mineralization indicated and, at one, copper mineralization is noted. A short distance to the east, north of the Barge Lake – Post Lake metasediments, Trowell (1976) indicates other, larger gabbro bodies with sulphide mineralization. Sanborn-Barrie and Skulski (1998) further indicate that some of these bodies are serpentinized peridotite. Is there a genetic relationship between any of the mafic-ultramafic bodies and the postulated suture zone? Regardless of the answer, the mafic-ultramafic bodies in the eastern part of the Sturgeon Lake belt should be considered as copper-nickel-PGE prospecting targets.

South of Graniteboss Lake, in the Billet Lake metasedimentary rocks, and to the south of the Billet Lake Deformation Zone, Stott and Wilson (1986) indicate two small gabbroic plugs. The OGS (1986) airborne electromagnetic survey of the Pickle Lake area indicates two distinct, short-strike length anomalies associated with these plugs. The assessment files show no record of diamond-drilling of these features. These anomalies and gabbroic intrusions are also considered good copper-nickel-PGE prospecting targets.

## **Gold**

The north part of the Sturgeon Lake greenstone belt is host to more than 60 gold occurrences and deposits. Most of these have not been explored in the past decade or more. Some, like the Jessie Lake-DonDick occurrence, have seen only limited prospecting since being discovered in the early 1900's. The last work completed at others, like the Powell occurrence, intersected gold mineralization in diamond drilling that is definitely worth follow-up. At the St. Anthony Mine, which was last explored in the mid 1980's, the granodiorite/trondhjemite rocks are altered and contain fracture-filling quartz veins over a width greater than 50 m. This has not been explored as a large-tonnage, low-grade gold target. The Sturgeon Lake gold field has many targets available for acquisition and exploration.

## **Volcanogenic Massive Sulphides**

The potential of the North Caribou Lake greenstone belt to host VMS deposits should be examined. Almost all past exploration in the belt has targeted gold mineralization. Other, important gold camps in the Superior Province, like Timmins, have VMS deposits near by. Indicators of the VMS potential in the North Caribou belt are: the Arsenic Lake Zn-Pb-Ag deposit; a large semi-conformable alteration zone at Akow Lake (with copper stringer mineralization); and felsic metavolcanics in the core of the Musselwhite syncline.

## **OGS ACTIVITIES AND RESEARCH BY OTHERS**

As part of Ontario's "Operation Treasure Hunt", the Precambrian Geoscience Section of the Ontario Geological Survey contracted with Dighem division of Geotrex-Dighem (a division of CGG Canada Limited) to complete airborne magnetic and frequency-domain electromagnetic surveys of the McVicar Lake greenstone belt. Data will be made available in early spring 2000.

K. Bethune of the University of Saskatchewan completed additional mapping of the Miniss River fault system during July 1999.

## SIoux LOOKOUT DISTRICT—1999

Table 15. Publications received by the Sioux Lookout District office in 1999,

Title	Author	Type and Year of Publication
Report of Activities, 1998, Resident Geologist Program, Thunder Bay North Regional Resident Geologist Report: Thunder Bay North-Sioux Lookout Districts	Mason, J.K., Seim, G., White, G.D., O'Brien, M.S., Farrow, D., Walden, A. and Komar, C.	OGS OFR 5988, 1999
Report of Activities, 1998, Resident Geologist Program, Red Lake Regional Resident Geologist Report: Red Lake and Kenora Districts	Blackburn, C.E., Hinz, P., Storey, C.C., Kosloski, L. and Ravnaas, C.B.	OGS OFR 5987, 1999
Report of Activities, 1998, Resident Geologist Program, Thunder Bay South Regional Resident Geologist Report: Thunder Bay South District	Schnieders, B.R., Scott, J.F., Smyk, M.C. and O'Brien, M.S.	OGS OFR 5989, 1999
Report of Activities, 1998, Resident Geologist Program, Kirkland Lake Regional Resident Geologist Report: Kirkland Lake and Sudbury Districts	Meyer, G., Cossec, M., Grabowski, G.P.B., Guindon, D.L. and Gosselin, S.D.M.	OGS OFR 5991, 1999
Report of Activities, 1998, Resident Geologist Program, Southern Ontario Regional Resident Geologist Report: Southeastern and Southwestern Districts, Mines and Minerals Information Centre, and Petroleum Resources Centre	Sangster, P.J., McGuinty, W.J., Papertzan, V.C., Steele, K.G., Lee, C.R., Laidlaw, D.A., Stewart, J.M. and Carter, T.R.	OGS OFR 5992, 1999
Summary of Fieldwork and Other Activities 1999	Ayer, J.A., Baker, C.L., Kelly, R.I., Stott, G.M. and Thurston, P.C.	OGS OFR 6000, 1999

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D. Laderoute, Northwest Regional Manager of the Resident Geologist Program edited this report and provided guidance in land use planning.

Table 16. Mineral deposits not being mined in the Sioux Lookout District in 1999.

Abbreviations					
AF .....	Assessment Files	MLS .....	Mining Lands, Sudbury		
CMH .....	Canadian Mines Handbook	MR .....	Mining Recorder		
GR .....	Geological Report	NM .....	The Northern Miner		
MDC .....	Mineral Deposit Circular	OFR .....	Open File Report		
MDIR .....	Mineral Deposit Inventory record	PC .....	Personal Communication		

Deposit Name/ NTS	Commodity	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
Arseno Lake 53B/14NE	Zn,Pb,Cu, Ag	1 MT @ 8.7% comb. Zn- Pb, 1.5 opt Ag	Energold Minerals Inc. Northern Dynasty Minerals Ltd	1988 Annual Report Northern Dynasty Explorations Ltd.	Inactive
Big Trout Lake 53H/12SW	Pt,Pd,Cr	not available	Platinex Inc.	AF	Active
Dobie Zone 52O/06NE	Au	301 000 t @ 5.5 g/t Au	Major General Resources Ltd.	MDIR KP1082	Inactive
Goldlund Mine 52F/16NW	Au	781 000 t @ 0.14 opt Au	Locke Rich Minerals Ltd..	MDIR K0311	Inactive
Kasagiminnis Lake 52O/08SW	Au	284 000 t at 5.8 g/t Au	Greenshields Resources Inc.	MDIR KP1129	Inactive
Koval-Ohman 52O/07SE	Au	471 589 t @ 5.81 g/t Au	Barrick Gold Corp.	MDIR KP0243	Inactive
Pickle Crow Gold Mine 52O/09SE	Au	1 395 700 t @ 0.186 opt Au (diluted)	Wolfden Resource Inc., Jonpol Explorations Ltd..	MDIR KP0255	Active
Thierry Mine 52O/08NW	Cu,Ni	7 MT @ 1.88% Cu, 0.23% Ni	Etruscan Enterprises Ltd.	MDIR KP0247	Inactive
Umex-Dorothy Lake 52O/06NW	Au	236 220 t @ 6.17 g/t Au	Major General Resources Ltd.	MDIR KP1072	Inactive
Karl-Zeemel 53B/09SW	Au	327 000 t @ 4.6 g/t Au	Pangea Goldfields Inc. Placer Dome North America Ltd.	N M, Jan. 8, 1996, p15	Active

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- Venn, V.R. 1982. Geological report on properties held under option in the area of the Northeast arm of Sturgeon Lake, NTS 52J/2E including: a) East Bay; b) Davidson Carr; c) Powell Occurrence; d) Island Occurrence.; Unpublished Company report, Sherritt Gordon Mies Ltd. Dryden, Ontario. 25p. Sioux Lookout District Assessment Files, File number 52J/02NE-0022-A1.
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# Metric Conversion Table

Conversion from SI to Imperial			Conversion from Imperial to SI		
SI Unit	Multiplied by	Gives	Imperial Unit	Multiplied by	Gives
LENGTH					
1 mm	0.039 37	inches	1 inch	<b>25.4</b>	mm
1 cm	0.393 70	inches	1 inch	<b>2.54</b>	cm
1 m	3.280 84	feet	1 foot	<b>0.304 8</b>	m
1 m	0.049 709	chains	1 chain	20.116 8	m
1 km	0.621 371	miles (statute)	1 mile (statute)	<b>1.609 344</b>	km
AREA					
1 cm <sup>2</sup>	0.155 0	square inches	1 square inch	<b>6.451 6</b>	cm <sup>2</sup>
1 m <sup>2</sup>	10.763 9	square feet	1 square foot	<b>0.092 903 04</b>	m <sup>2</sup>
1 km <sup>2</sup>	0.386 10	square miles	1 square mile	2.589 988	km <sup>2</sup>
1 ha	2.471 054	acres	1 acre	0.404 685 6	ha
VOLUME					
1 cm <sup>3</sup>	0.061 023	cubic inches	1 cubic inch	<b>16.387 064</b>	cm <sup>3</sup>
1 m <sup>3</sup>	35.314 7	cubic feet	1 cubic foot	0.028 316 85	m <sup>3</sup>
1 m <sup>3</sup>	1.307 951	cubic yards	1 cubic yard	0.764 554 86	m <sup>3</sup>
CAPACITY					
1 L	1.759 755	pints	1 pint	0.568 261	L
1 L	0.879 877	quarts	1 quart	1.136 522	L
1 L	0.219 969	gallons	1 gallon	<b>4.546 090</b>	L
MASS					
1 g	0.035 273 962	ounces (avdp)	1 ounce (avdp)	28.349 523	g
1 g	0.032 150 747	ounces (troy)	1 ounce (troy)	<b>31.103 476 8</b>	g
1 kg	2.204 622 6	pounds (avdp)	1 pound (avdp)	<b>0.453 592 37</b>	kg
1 kg	0.001 102 3	tons (short)	1 ton (short)	<b>907.184 74</b>	kg
1 t	1.102 311 3	tons (short)	1 ton (short)	<b>0.907 184 74</b>	t
1 kg	0.000 984 21	tons (long)	1 ton (long)	<b>1016.046 908 8</b>	kg
1 t	0.984 206 5	tons (long)	1 ton (long)	<b>1.016 046 90</b>	t
CONCENTRATION					
1 g/t	0.029 166 6	ounce (troy)/ ton (short)	1 ounce (troy)/ ton (short)	34.285 714 2	g/t
1 g/t	0.583 333 33	pennyweights/ ton (short)	1 pennyweight/ ton (short)	1.714 285 7	g/t

## OTHER USEFUL CONVERSION FACTORS

	Multiplied by	
1 ounce (troy) per ton (short)	31.103 477	grams per ton (short)
1 gram per ton (short)	0.032 151	ounces (troy) per ton (short)
1 ounce (troy) per ton (short)	20.0	pennyweights per ton (short)
1 pennyweight per ton (short)	0.05	ounces (troy) per ton (short)

*Note: Conversion factors which are in bold type are exact. The conversion factors have been taken from or have been derived from factors given in the Metric Practice Guide for the Canadian Mining and Metallurgical Industries, published by the Mining Association of Canada in co-operation with the Coal Association of Canada.*